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Map of Central Europe

North Dakota Comes into Its Own
With 43 Illustrations and Map — LEO A. BORAH
35 in Natural Colors — J. BAYLOR ROBERTS

The National Geographic Society's New Map

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North Dakota Comes into Its Own

By Leo A. Borah

With Illustrations by National Geographic Photographer J. Baylor Roberts

As this issue of the National Geographic Magazine reaches Society members, hundreds of combines are sweeping across the golden fields of North Dakota, harvesting one-tenth of the Nation's wheat crop (pages 292 and 293).

North Dakota produces more wheat than any other State except Kansas. In hard red spring wheat and durum, source of macaroni and spaghetti, it ranks first. It led the country in flax in 1950, vied for top honors in barley and rye, and stands high in production of potatoes, sugar beets, and hay.

Under its western grasslands lie 600 billion tons of lignite coal, and last April high-grade oil was struck in a flowing well at Tioga, between Minot and Williston (map, pages 286-7).

People Have Spirit of "Never-say-die"

Rich, deep soil and vast natural resources on the eve of development are tremendous assets, but the greatest wealth of North Dakota is in the "never-say-die" spirit of its people. In spite of blizzards, floods, drought, dust storms, grasshoppers, and all manner of devastating plant diseases, they have clung to their faith in the land. That faith has been justified by ten successive crops which have brought them from near-bankruptcy in the 1930's to such prosperity that the gross income from the average farm in 1950 was $9,000.

No longer is agriculture in North Dakota the desperate gamble it was when the only crop was wheat, the unpredictable. Diversified farming, crop rotation, summer fallowing, irrigation, airplane spraying of fields to kill grasshoppers and to destroy weeds, and development of drought- and disease-resistant varieties of grain have removed some of the hazards. Undoubtedly there will still be bad years when acre yields will be curtailed, but even the most adverse conditions will hardly cause complete failure as in the past.

North Dakota is no place for the timid or the weak; its winters are too rigorous, its summers often too hot and dry. To the courageous and hardy, however, it is truly a land of opportunity.

When I arrived in Bismarck in mid-April this year, to begin my last survey of the State, the capital city was crowded with oilmen. Courteous Frank Hayes, manager of the Patterson Hotel, who came to my rescue with a comfortable room, told me that speculators from outside the State were engaging whole floors in the hotels.

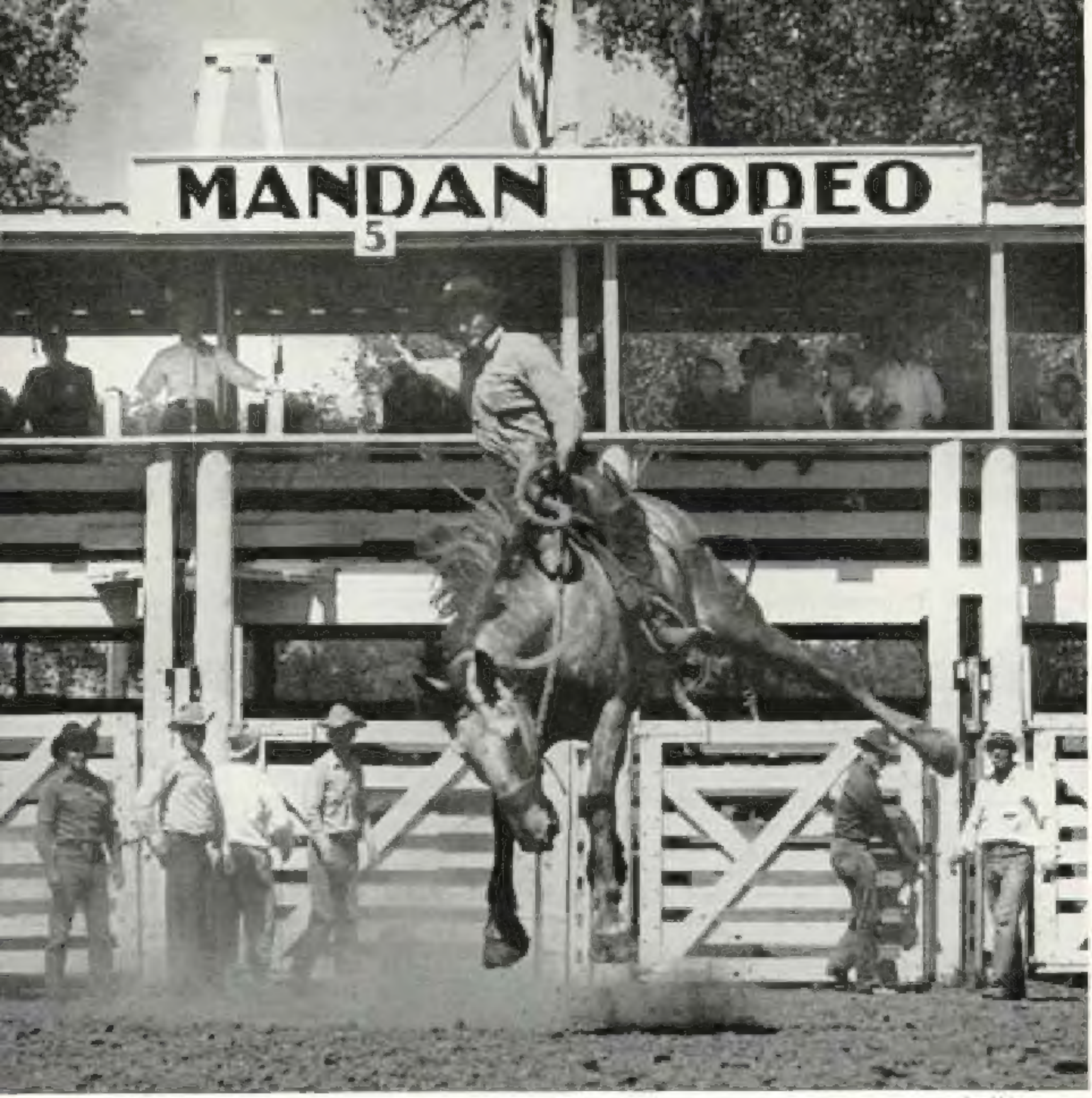
"It's even worse in Minot," he said. "They swarmed in the minute the news of the oil strike leaked out. I hear they are paying from $5 to $10 an acre for leases on farms many miles away from the Tioga well.

"There is no doubt that the oil is there, but whether it's near enough the surface to make drilling profitable is a question. The first well, already 11,000 feet deep, has cost $400,000. The flow is 400 to 600 barrels a day."

Before I left North Dakota, the Tioga well had been capped, and the drillers announced they would deepen it to 13,000 feet.

Skyscraper Capitol a Bargain

The 19-story capitol, tallest building in North Dakota, dominates the scene in Bismarck (page 291). Towering above a hill to the north of the town, it can be seen for many miles across the rolling prairie. The little city, with a population of less than 20,000, is built on bluffs above the Missouri River. Its streets are broad, its buildings low. In such



234 Lee Muir

"Let Him Pitch!" Luckless the Contestant if He "Pulls Leather"

Out of the corral gate at Mandan rodeo rockets a leaping demon topped by a daring buckaroo. The rider must stay with his mount for 10 spine-jarring seconds to remain in competition. Horses used in North Dakota shows are not trained buckers but wild mustangs straight from the ranges.

a setting the height of the capitol is accentuated (page 293).

"Some people criticize us for building a skyscraper statehouse on the prairie," Russell Reid, superintendent of the State Historical Museum, told me, "but nobody can say the taxpayers didn't get their money's worth in the construction. Fire destroyed the old capitol in 1930, and the new one went up in the depths of the depression when prices for everything were down. The architects scoured the country for ideas and gave us an edifice with interior space 80 percent usable—one of the most efficient public buildings in the United States—for a total cost of only $2,000,000."

Mr. Reid has in the museum a fine collection of Indian relics. Many decades before Pierre de la Vérendrye—first white man to set foot on the territory that is now North Dakota—came up the Missouri in 1738, industrious Mandans, Hidatsas, and Arikaras were tilling the soil there and raising good crops.*

The warlike, nomadic Sioux who ranged around the Turtle Mountains, westward into Montana and south into South Dakota, were bitter enemies of the farmer folk.

Today, most of the agricultural Indians live

* See "Indians of Our Western Plains," by Matthew W. Stirling, NATIONAL GEOGRAPHIC MAGAZINE, July, 1944.

on the Fort Berthold Reservation on the Little Missouri (pages 310-11 and 317). Near Rolla, close to the Canadian border, is the Turtle Mountain Reservation. The Fort Totten Reservation is south of Devils Lake; the Standing Rock Reservation, where, near Fort Yates, the famous Indian chief Sitting Bull is buried, is the home of Sioux tribesmen.

The Mandans and their farmer allies built houses of logs covered with earth. A full-size model of one of these early dwellings has been erected on the Capitol Building grounds.

"During the worst winter of the depression," said Mr. Reid, "relief agencies sent food to the Indians at Fort Berthold. There were potatoes from Maine—'coals to Newcastle' in this potato-growing State—and grapefruit from Florida. Of course the Indians, some of whom speak only a few words of English, had no idea what the grapefruit were; but they would shoulder bushel bags of them and stride off for home in 30°-below-zero weather. Doubtless the grapefruit were frozen solid before the Indians had carried them half a mile."

The Mandans, Hidatsas, and Arikaras actually raised corn on their northern farms. It was small and short-eared, but it matured in the brief growing season. Painstakingly, experts at the North Dakota Agricultural College have crossed that flinty Indian corn with larger and better varieties to produce strains that can be grown profitably throughout most of North Dakota.

Bismarck had turbulent beginnings as a port of call for steamboats carrying freight and passengers up the Missouri to Fort Benton, Montana, in the sixties. It was known simply as The Crossing when the Northern Pacific, first railroad in North Dakota, reached the Missouri River in 1873. Rails had been laid to Fargo in 1872, and transportation from there to the camp which became Bismarck had been by wagon trains.

The Bismarck *Tribune* Told the World of Custer

Lt. Col. George A. Custer and his 7th Cavalry were bivouacked at Fort Abraham Lincoln, which included old Fort McKeen (page 316), across the Missouri from Bismarck in 1873. Here he and his attractive wife were the center of gay social activities. When Custer set out from Fort Lincoln in 1876 with his troops for the campaign which ended in the tragic Battle of the Little Bighorn in Montana, his wife rode gally with him for a little distance.

On July 5, 1876, the steamer *Far West*, piloted by Capt. Grant Marsh, came into Bismarck with the desperately wounded from Maj. Marcus A. Reno's command. Marsh brought the news that Custer's entire command had been annihilated. Twenty-six women at Fort Lincoln learned that they were widows.

The Bismarck *Tribune*, oldest newspaper in North Dakota (it has been in publication continuously since July 11, 1873), had sent Mark Kellogg as a reporter with Custer's troops. Kellogg was killed in the battle, but his notes were found on his body. On July 6 the *Tribune* told the world the story of the Custer disaster, and telegraphed details to the New York *Herald* at a reported cost of $3,000 for 24 hours' use of the wires.

Though most of the business in Bismarck stems from State government offices, the city has a thriving trade as the distributing point for a vast wheat-growing area. It has grain elevators, flour mills, creameries, and the largest seed house and nursery in the State, specializing in seed corn developed from the quick-maturing variety grown in early days by the Mandan Indians.

No "Putting on Airs" in North Dakota

"Nobody has enough help here when the legislature is in session," the hotel manager said. "Some of the legislators bring their wives with them, and the women get tired of just sitting around. It's nothing unusual for them to take jobs to fill their time."

North Dakota is "plain as an old shoe." "Putting on airs" is unheard of, and even the wealthiest farmers toil in the fields with their hired hands.

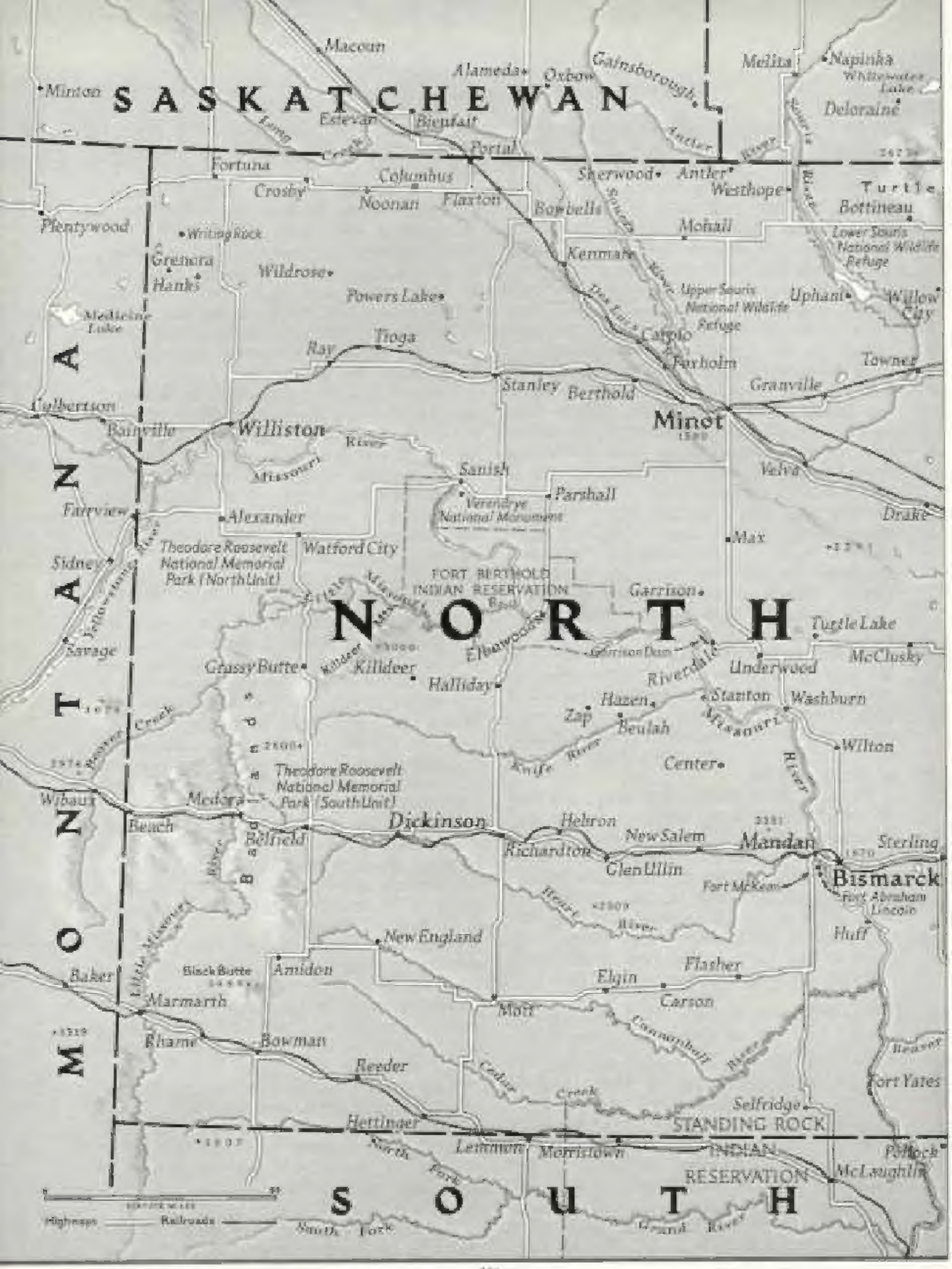
A day or two after my arrival in Bismarck, a companion and I rode 75 miles northwest to Garrison Dam on the Missouri and the new, ultramodern town of Riverdale, population about 4,000, conjured upon the bare prairie by U. S. Army Engineers.

Eight tunnels—one, 26 and two, 22 feet in diameter, for flood control, and five, 29 feet in diameter, for power—were nearing completion (page 315); and the tremendous embankment was growing rapidly as giant trucks, each carrying 30 cubic yards of earth, dumped their loads upon it.

When completed, Garrison will be the biggest rolled earth-fill dam in the world. It will contain approximately 67 million cubic yards of earth, packed down by sheeps-foot rollers which exert upon it 640 pounds pressure to the square inch. Steel sheathing and rock facing will prevent erosion by the water.

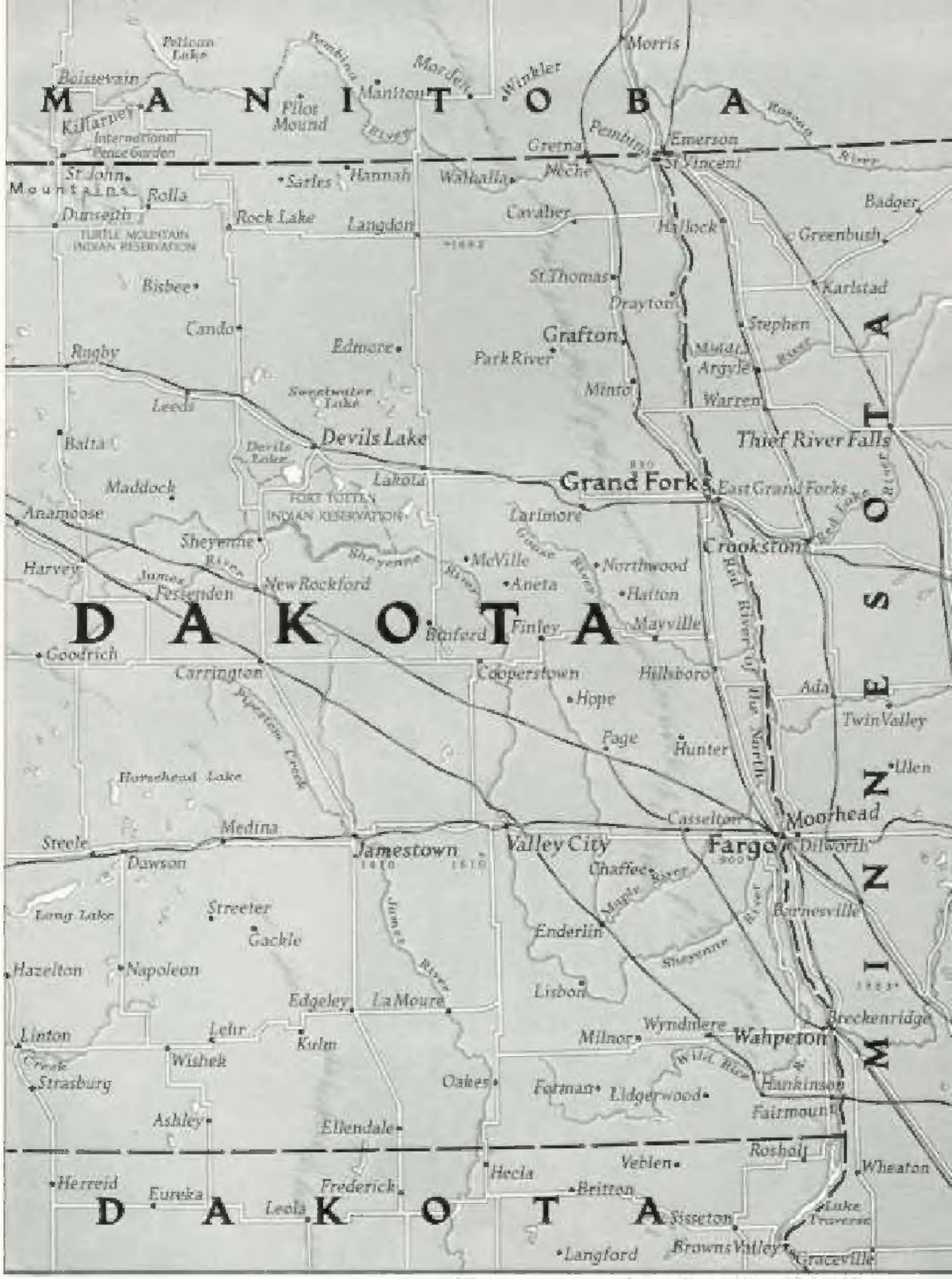
The dam will furnish eventually 400,000 kilowatts of electric energy. A part of the Pick-Sloan Plan for control of the Missouri River, it will prevent floods and metamorphose agriculture.*

* See "Taming the Outlaw Missouri River," by Frederick Simpich, NATIONAL GEOGRAPHIC MAGAZINE, November, 1945.



Under Western North Dakota Grasslands Lie 600 Billion Tons of Lignite

Scientists are now developing the possibilities of this vast store of fuel and chemicals. The weirdly sculptured Badlands are cut like sunken gardens into the Missouri slope, highest of three levels in the State. Here the soil is light and thin, but it grows large wheat and hay crops. Central drift prairies, of lower altitude, are the product of glaciation, with thicker, richer topsoil good for grain.



Drawn by Harry S. Oliver and Irvin E. Altman

A Vast Fresh-water Ocean Once Rolled Over What Is Now Eastern North Dakota

Far larger than the five Great Lakes combined, ancient Lake Agassiz left on its bed, lowest level in the State, deep deposits of chernozem, the rich, black earth that makes North Dakota a "breadbasket of the Nation" with its crops of hard spring wheat. Geologists say that the Red River of the North, which now runs north to Lake Winnipeg, flowed south for centuries as an outlet for glacier-created Lake Agassiz.

Unloading Wheat, an Electric Dumper Tilts a Ponderous Boxcar with Herculean Ease

Car and contents at a Grand Forks terminal weigh about 80 tons. In seven minutes of lifting and casting, 60 tons of grain pour down chutes to storage bins. Most North Dakota wheat goes to Minnesota mills.

The Fort Peck Dam in Montana is completed.* The Garrison in North Dakota will be finished by 1954, and the Oahe and Fort Randall in South Dakota are scheduled for completion thereafter.

From a point a short distance below the Fort Peck Dam it is proposed to divert water to irrigate a vast area in North Dakota and to raise the level of Devils Lake, largest body of water in the State.

The Garrison Dam will create a lake 200 miles long, and the Oahe, near Pierre, South Dakota, will back water up to Bismarck. Thus a land now semiarid will be converted into a well-watered area suitable for intensive farming.

In excavating for the Garrison Dam, the Army engineers uncovered thousands of tons of lignite coal. This has been separated from the earth and clay and piled in great ridges below the embankment. It is used as fuel to furnish power for the construction machinery.

The dam will be 12,000 feet long, 2,600 feet wide at the base, 60 feet wide at the top, and 210 feet high. Its crest will carry a four-lane highway. Earth dug to build the dam would leave a hole a city block square and more than four miles deep.

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Here United States and Canada Pledge Eternal Amity

International Peace Garden, a 2,200-acre natural park dedicated to friendship between the countries, lies partly in North Dakota, partly in Manitoba. The cairn stands astride the border north of Dunseith. Besides a rustic lodge and other buildings, the area contains a lake, indigenous trees and shrubs, and landscaped vistas.

From Riverdale north to Minot the smooth highway goes through wheat country. Traces of snow from heavy winter falls still lingered along the way, and seeding was late. Here and there were shallow pools dotted with wild ducks and geese. The spring migration was in progress. An estimated 65,000 snow geese and Canadian honkers had descended on Devils Lake a few days before.

We saw scores of ring-necked pheasants along the fence rows. Sometimes these game birds are so numerous that motorists are cautioned to drive carefully to avoid killing them on the highways.

We watched two ring-neck cocks, handsome fellows, sparring near the road. They put up a battle for the favor of the drab-looking hens. Shooting is prohibited by law in the spring, and game birds seem fearless then.

In the fall, however, North Dakota is a huntsman's paradise. Most of the pheasants were imported from China several years ago. On a main flyway of the mid-continent, North Dakota lakes and streams are breeding places for myriad ducks and geese (page 300).

Minot, which sprang up overnight in 1887 when the Great Northern Railway was being pushed toward the Pacific Coast, is a fast-growing city of 21,924, third in size in North Dakota. Near it are the Souris waterfowl propagation areas. The slow-moving Souris River winds for eight miles through the city.

* See "Montana, Shining Mountain Treasureland," by Leo A. Borah, NATIONAL GEOGRAPHIC MAGAZINE, June, 1950.

From this stream hundreds of acres of rich farmland are irrigated.

Time was when conductors on the Great Northern trains approaching the city are said to have called, "*My-not:* Prepare to meet thy God!" The town was then a rough frontier settlement which had grown to 5,000 population in a few weeks. Today it is a clean, prosperous business and residential city, seat of Minot State Teachers College, largest of five North Dakota normal schools. Others are at Valley City, Mayville, Dickinson, and Ellendale.

In the Minot area farms are generally larger than in the Red River Valley to the east. Wheat is the principal crop, and the city has an important privately owned grain-shipment inspection station (page 297). Besides wheat and other crops, Minot farms raise fine sheep and cattle.

Badlands, Region of Mystery and Beauty

The area west of the Missouri River is North Dakota's wild West. Here are the mysterious and weirdly beautiful Badlands (pages 308, 314, and 318), a considerable portion of them included in Theodore Roosevelt National Memorial Park. The south unit of the park is near Medora, west of Dickinson, the north unit south of Watford City.

To regain his health and recover from grief after the loss of both parents and his wife, Roosevelt came to Medora in 1883 at the age of 25. He was actively engaged in cattle raising here from 1883 to 1887. A cabin he lived in has been removed to the grounds of the Capitol Building at Bismarck, where it is used as a museum of Rooseveltiana (page 305).

At the time of Roosevelt's sojourn in the Badlands, a young French nobleman, the Marquis de Mores, set up at Medora the first meat-packing plant in North Dakota. He built a magnificent château, which can still be visited, and erected for his bride the first Catholic church in the region. His packing plant and other enterprises failed after three disastrous years, and De Mores returned to France.

Though carved like comparable areas in South Dakota* and Montana by the action of water on clay and sandstone, the North Dakota Badlands are different from those in the neighbor States. They are mighty clay and stone hills with color-streaked walls thrust up from flat land. On the bluff sides are alternating stripes of red and brown, spotted with red scoria. Black outcroppings of lignite and sparkling patches of snowy selenite mingle in brilliant patterns.

Among the hills are spaces covered with sagebrush. Twisted evergreens, showy cacti, fragrant evening primroses, and clumps of willow grow along stream beds.

Through the 4,000 square miles of the rugged country the Little Missouri winds a tortuous course, often dropping a thousand feet in 20 miles. Black Butte, 3,468 feet, highest point in North Dakota, towers 700 feet over the floor of the area. Here are petrified forests, caves holding ice even in midsummer, and all manner of Nature's sculpture.

Some observers believe part of the mineral coloring in the Badlands to be due to the burning out of beds of lignite coal. Near Amidon and at two or three other spots in the region, unquenchable underground fires are still burning (page 318). The fires have advanced only a few hundred feet in 50 years. Probably they have been raging for centuries.

Relics of prehistoric Indians are found north of Williston, the most notable the strange Writing Rock between Grenora and Crosby (page 314). Archeologists have uncovered evidence in this area suggesting human occupation millenniums before the coming of the known Indians.

The part of North Dakota between the Missouri River and the Badlands is predominantly range country, though it contains many large farms where wheat and other crops are grown. With considerably less rainfall than the drift plains in the central part of the State and the Red River Valley in the east, it is better suited to stock raising than to general farming.

At Bowman, in the southwestern corner of the State, is a plant where Van Dyke brown is made from lignite. North Dakota produces more than 50 percent of the Van Dyke brown dye used in this country.

Where the Old Wild West Still Lives

At Mandan, a railroad town of 7,268, across the river from Bismarck, the atmosphere of cowboy days still lingers. The annual rodeo here attracts entrants from all over the West (page 284). Dickinson, too, near the edge of the Badlands, and the little town of Sanish, near the Fort Berthold Indian Reservation, put on big wild West shows.

Besides the usual broncobusting, steer roping, and bulldogging, these rodeos feature races between teams of cowboys to capture, saddle, and ride wild horses from herds driven into the arena. Another unusual competition is between teams who rope wild cows from a herd and milk them. The team first to take half a cup of milk to the judges' stand wins.

The manufacture of briquettes from lignite

* See, in the National Geographic Magazine: "The West Through Boston Eyes," by Stewart Anderson, June, 1949, and "South Dakota Keeps Its West Wild," by Frederick Simpich, May, 1947.

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Kodachrome by J. Baylor Roberts

State Capitol, North Dakota's Lone Skyscraper, Soars 19 Stories Above Prairie at Bismarck

Executive and legislative offices occupy this limestone structure, built in depression years for $2,000,000. High-school bandsmen and drum majorettes display national and State flags before a pioneer group in bronze.

Like Steamers on a Sandy Sea, Combines Move Across Golden Wheat Fields, Leaving Curving Wakes of Stubble

[illegible]

Whirring Combine Harvests Wheat Almost in the Shadow of the Sioux State's Towering Capitol

North Dakota's Trademarks Grain Elevators Etched Against Prairie Sky

[illegible]

These Stand at New England, Named by Yankee Colonists Far from Home

From Grandstand Seats, Carefree Massville Youngsters Watch Work That Makes North Dakota an Agricultural Empire

[illegible]

Laboratory Magic Gives North Dakota Bigger, Better Crops

[illegible]

Inspector's "Shield" Takes Samples of Grain on a Hopper

[illegible]

Evelyn Hill Gives Lumberjacks Pump a Champion Shoeshine

Lorient Whitelace Gets a Visual Beauty Treatment

coal overshadows the wheat and cattle businesses in Dickinson, a city of 7,457. This fuel is made by charring the lignite and binding it into small briquettes with substances extracted from the raw product. For each ton of briquettes about 2.8 tons of lignite are used. The briquettes burn like charcoal, with intense blue flames. From a large, modern plant 30,000 tons of briquettes are shipped out annually. They are superior fireplace fuel.

Williston, 7,353 population, has an important Experiment Station of the North Dakota Agricultural College. Here are conducted studies in scientific irrigation and tests of rust- and smut-resistant grain. Both sprinkler and siphon irrigation are tested (page 321). In the cool, dry air of North Dakota all-day watering in full sunlight can be carried on without danger of wilting crops.

Excellent crops of high-quality wheat are grown by dry farming in the Williston area. To preserve the soil and conserve moisture, summer fallowing is practiced. Ingenious machines called surface tillers are used to remove all weeds and pulverize the soil to a depth of four inches. This process creates a dust blanket which holds moisture.

Just after the spring rains and three or four times more in the course of the summer, the surface tillers go over the fields. The result is that enough moisture is retained under the dust blanket to give the following year's crop a good start. Contour plowing and strip farming are also practiced with success.

Flat North Dakota No Longer Monotonous

I took the Northern Pacific train across terrain ever more level to Fargo, the metropolis of North Dakota, a bustling city of 37,981. On previous visits this flat country had seemed to me monotonous and uninteresting. Now I had acquired new respect for it. It was once treeless, stretching away in unbroken sweep to the far horizon. Nowadays it is dotted with groves and tree rows planted to foil the winds that cause dust storms and erode the land.

A State-wide campaign of tree planting is under way. With mechanical planters thousands of seedlings from the State nurseries at Mandan and elsewhere are being set across the farmlands. The only sizable natural forests in the State are those in the Turtle Mountains near Bottineau, where the State School of Forestry is located. In a few years, however, there will be hardly a farm in the State without its groves and tree-row wind breaks.

At Fargo, William P. (Bill) Sebens, field representative of the Greater North Dakota Association, met me. Bill knows and loves every part of North Dakota. Under his guidance I obtained an intimate view of the most interesting things in the State.

Fargo is as typically midwestern as an Iowa or Indiana city (page 301). By eastern standards it is small, but population is no index to the importance of North Dakota cities. Fargo is the distributing point for a vast agricultural empire which ranks as one of the richest in the world.

In recent years it has taken much business from Minneapolis. Here are farm-machinery plants, flour mills, and a big packing plant of Armour and Company. Across the Red River in Fargo's twin city, Moorhead, Minnesota, is a big sugar factory which handles enormous crops of beets, raised extensively on both sides of the river.

Bill and I went first to the 70-acre campus of the North Dakota Agricultural College in the outskirts of Fargo. Here North Dakota crops are safeguarded and improved by the most efficient system of research I have ever observed.

President Fred S. Hultz expressed for me in a few words the purpose of the college.

"We have in North Dakota," he said, "more hazards than the average farm State. Because of climatic uncertainties, our problems are difficult. We try here at the college and in our experimental farms throughout the State to combat natural hazards and insure our farmers against calamity."

I talked to Dean Harlow L. Walster of the School of Agriculture. He pointed out to me that North Dakota has three distinct levels and three different types of soil: the Red River Valley, containing the lowest point in the State, altitude 750 feet—the flat bed of ancient Lake Agassiz where the soil is deep black chernozem, rich as the Valley of the Nile; the drift plain, a higher, glaciated area, with earth still rich but somewhat lighter in color; and the Missouri slope, still higher, with thin, light soil best suited for grazing.

"We try," he explained, "to develop seed and methods of farming adapted to each of the three levels."

Two Crop Magicians Have Worked Miracles

Since North Dakota Agricultural College opened its doors to students in 1891, many of its faculty members have rendered distinguished service to farmers. Two have made such remarkable records that no description of the State would be complete without reference to their achievements.

These men are Dr. Henry L. Bolley, now retired, who rescued the flax crop of the world from deadly wilt, and Dr. Lawrence R. Waldron, plant breeder, who has developed strains of rust-resistant wheat which save North Dakota farmers at least 20 million dollars annually. When I visited Dr. Waldron in his office at the Agricultural College experiment

Geese Darken the Sky over a Grounded Near Oakes

[illegible]

Fargo's Broadway: Throbbing Heart of a Farm Empire

[illegible]

When Blizzards Blow, Snowplows Struggle Through Limitless Fields of Drifting White

Chinook winds [illegible] clean sweep [illegible] winter travel was perilous here, and many [illegible] lost their lives [illegible]

station, he was working on crosses to combat a new rust which threatens calamity to even its highly resistant Marquis and Kota wheat (page 297).

When Dr. Bailey began work on flax, a [illegible] wilt was ruining crops [illegible] He began plantings [illegible] seed from all over the world in an experimental plot at the college which some of his colleagues [illegible] "Bailey's Folly." In the soil of that plot were spores of all the diseases known to flax. Dr. Bailey reasoned that if he could develop a strain that would grow in such soil he could solve the flax problem.

After exhaustive research and endless crossings of plants, he discovered the fungus parasite that caused the fatal wilt. He then produced wilt-resistant varieties that defied the infected soil of Bailey's Folly and saved the crop.

In his greenhouse at the Experiment Station Dr. Waldron makes crossings of [illegible] varieties of wheat. He [illegible] from a [illegible] one of the wheats used in the cross is a popular [illegible] the other a kind [illegible] and to be [illegible] to rust and smut. Seeds from [illegible] are placed care[illegible] [illegible] When the plants ma-

Where Once Only Dust Storms Threw, Herds of Whitefaces Grow Fat

[illegible] gray soil in southeastern North Dakota, taken out of cultivation [illegible]

[illegible] the wheat in vield is planted and [illegible] the grasslands.

In [illegible] the varieties are [illegible] an Experiment Station [illegible] which has [illegible] years of [illegible] for them. The crop is harvested at the end of the season and [illegible] more yield per [illegible] and more weight. Kind obviously [illegible] are [illegible] and the best [illegible] are tested for [illegible] and [illegible].

[illegible] Dr. Worton [illegible] developed his work [illegible] Mexico [illegible] other [illegible] a [illegible] Soil [illegible] in the [illegible] North Dakota plant [illegible] of 20. Worton [illegible] varieties of wheat. He [illegible] to the average [illegible] year by [illegible] bushels.

When [illegible] Dr. [illegible] Holz [illegible] his [illegible] to the [illegible] to 25 [illegible] bushels [illegible] per acre, he [illegible] regular [illegible] he's a [illegible] generated [illegible] grand [illegible] I [illegible] now [illegible] bushels [illegible] per [illegible].

[illegible] more beautiful [illegible] a [illegible] of [illegible] the [illegible] exquisite blue [illegible] to the [illegible] of [illegible] as [illegible] golden [illegible] in the [illegible] North Dakota farmers [illegible] Dr. Worton [illegible] for [illegible] more [illegible] [illegible] years.

[illegible] Grand Forks [illegible] in North

Dakota, is the State University, where the new lignite research laboratory of the U. S. Bureau of Mines is finding hitherto unsuspected uses for the State's tremendous supply of 600 billion tons of lignite coal. Alex C. Burr is in charge of the laboratory and the pilot plant where 400,000 cubic feet of heating gas has been made in a day from the low-grade fuel. The gas from the plant may soon supply needs of the University and the city of 26,617.

"We have found out a few of the many ways to use lignite," Mr. Burr said. "When it comes out of the ground, it is 30 to 40 percent water; consequently, to ship it far from the mines is not economical. By intense heat from furnaces we can drive off the water, then ship the coal to plants where further treatment reduces it to liquid fuel and heating gas.

"There is enough lignite in North Dakota to keep the entire United States in abundant fuel for generations. Just now the cost of producing gasoline and gas from raw lignite is high, but eventually petroleum from oil wells will become more expensive and the processing of lignite cheaper; then our product will be in high demand.

"Lignite in char form may be used to reduce low-grade iron ore, sufficiently freeing it from impurities to make mining profitable. From lignite also we are already obtaining considerable quantities of creosote. The uses of this newly tested natural resource are numerous."

Like the State Agricultural College at Fargo, the University labors constantly to improve North Dakota. It is the home of the State Medical Center, supported by a one-mill tax levy and created to improve medical services and to educate doctors, nurses, and technicians.

Founded in 1883, as the University of Dakota Territory, the University opened its doors less than 10 years after the battle of the Little Bighorn. North Dakota did not become a State until 1889.

Cream of Wheat Started in Grand Forks

President John C. West proudly directed my attention to the fine new buildings going up on the campus. The school is growing rapidly and now has an enrollment of about 3,000 students.

Grand Forks has considerable industry: flour mills, a packing plant, a large potato-flour factory; across the river, in East Grand Forks, Minnesota, is a beet-sugar refinery. In the surrounding country diversified farming is the watchword. I was interested to learn that Cream of Wheat was manufactured first in Grand Forks before the company moved to Minneapolis.

Bill and I talked to several of the leading farmers at a potato growers' meeting. John Scott, who farms 4,500 acres, told us he plants about 600 acres to potatoes, half that area to beets, and the rest to wheat, flax, rye, barley, and alfalfa. He rotates his crops and occasionally summer-fallows a part of his land.

Agriculture in the Red River Valley is more highly mechanized than in any other area I have visited. Machines plant beets and potatoes, weed the fields, and dig the crops. Machines handle the wheat and other grain from seedtime to harvest, the combines reaping and threshing as they sweep across the fields.

Bill showed me color motion pictures he had taken of agricultural processes in all seasons throughout the State. One reel featured airplane spraying of crops to kill weeds. I watched the plane flying low over a field depositing 2-4 D on spring wheat. A later part of the film revealed the same field several weeks later. The grain appeared green and weedless save for a 15-foot strip of bright-yellow mustard across the center. Evidently the pilot had misjudged his flight and missed that strip with his weed killer.

"Grasshoppers were terrible before we began spraying them from planes," Bill declared. "They would descend on a section of growing wheat in the morning and by sunset there wouldn't be a spear of green left. They wouldn't eat poisoned bran spread on the ground.

"But now we spray or dust the growing wheat with poison that really kills them. They are turned from a deadly menace into a fairly useful fertilizer."

Some of the motion pictures showed ingenious machines in action. In one sequence a wheat farmer was pulling with a tractor a seeder consisting of three 14-foot units hitched together. He was seeding a strip 42 feet wide each time he crossed the field—160 acres a day.

"That kind of speed saved crops in 1950," Bill told me. "Spring was so late that it looked as if we'd never get the wheat in in time to mature before frost. Luckily, we had a mild October, and by working combines from early morning till long after dark, we got in the third biggest crop in the history of the State."

If a farmer cannot find a machine to do the sort of work he wants, he devises something for his purpose. Some farms in the Red River Valley are so flat that it is difficult to run irrigation water across them. Often shallow swales in the fields become mudholes. By the use of terrace plows, ranchers fill the swales and dig sloping ditches which readily carry the flow of water.

The average farm in North Dakota has approximately 600 acres; the average for the

Teddy Roosevelt Learned to Live the "Strenuous Life" in This Cabin

Now set permanently on the State Capitol grounds in Bismarck, the log house serves as a museum [illegible]

whole United States is about [illegible]. For years there has been a trend toward [illegible] Dakota farms, and some ranches are [illegible] acres [illegible]. [illegible] most large farms are worked [illegible]. The coming of irrigation will bring more intensive [illegible] and to reduce the size of individual farms.

In the early days of land settlement in North Dakota, when the Northern Pacific was encouraging homeseekers, [illegible] "bonanza" farms were owned by eastern capitalists who hired managers to operate them. These farms ranged from [illegible] acres to [illegible] in the [illegible].

The slogan of that time was [illegible] bushels of wheat to the acre and a dollar a bushel. Because of careless use of the land [illegible] the wheat yields became lower, [illegible]

A Girl Who Gave Her Life for Others

Nowadays most main [illegible] highways are [illegible] the winter, but [illegible] years ago roads were often impassable. One dark winter afternoon in 19[illegible], [illegible]-year-old Hazel Miner started home with her younger brother and sister from school. [illegible] in snow [illegible] wind. [illegible]

The girl covered the younger children with every [illegible] she could find in the [illegible] and finally lay over them to protect them. The next morning Hazel was found frozen to death [illegible]. At the courthouse at [illegible] stands a granite monument to the young heroine.

The North Dakota [illegible] wildflowers in spring and summer. [illegible] pasqueflowers, which [illegible] of the long snow. Later come the wild rose, the State flower, and a [illegible] of other blooms (page [illegible]) [illegible]

A [illegible] in 18[illegible] on the plain where Fargo is now [illegible] with blossoms. It is a beautiful [illegible] but I doubt that human beings will ever live here.

Strangely, farmers from wooded areas

looked askance in the early days at treeless country. They felt that ground from which forests had been cut was far richer.

One evening Bill took me with him to a Community Club meeting in the little village of Chaffee, where he lectured and showed his motion pictures of the North Dakota water program. Interested in irrigation, farmers had come from miles around to attend the meeting.

Everywhere in the State, folk are eager to learn new methods of agriculture.

North Dakotans Ready to Take Chances

"They are the greatest people I ever saw for taking a chance," Bill told me. "Whenever a fresh idea comes out on how to improve crops, they will try it whatever the cost."

We went from Fargo to Wahpeton in one afternoon through a country of perfectly kept farms. Here is a rich dairying and livestock-growing section where purebred cattle are a specialty (page 303).

In Wahpeton is one of the unusual industries of the Northwest, a pottery plant. It was established a few years ago by Laura Taylor, who had studied ceramics at the University of North Dakota. Robert Hughes, a successful printer, who later became her husband, backed the enterprise.

Mrs. Hughes was molding ash trays decorated with dog heads copied from the NATIONAL GEOGRAPHIC MAGAZINE (page 307).

Clay handled in the plant comes from enormous beds near Mandan. At first it was used without addition of other substances, but now a little feldspar from South Dakota is added with it. Rosemade glazed pottery is shipped all over the world. Because the designs feature birds and animals, it has become a favorite with collectors.

As a gift to his city, Mr. Hughes has created a recreation park in a once unsightly riverside flood area. Wahpeton is the seat of the State Science School, where students are given vocational training.

The unpredictable North Dakota climate produced a snowstorm on a Saturday late in April, but the following Monday when Bill and I drove to Valley City and Jamestown the snow had disappeared. This throwback of winter was delaying the seeding, and the only traces of green we saw were a few fields of winter rye. Ordinarily, wheat is all sowed before the first of May.

At Valley City we drove past the trim campus of Valley City State Teachers College and dropped in at an unusual clothing store. This store, though located in a country town of less than 7,000 population, carries a stock of men's wear fully as varied and up-to-date as that of the best eastern shops.

"People here want the best money can buy," the proprietor explained, "and they have the cash to pay for it. Probably this store looks too elegant for a small city, but it is a profitable venture."

I had noticed an unusual number of expensive automobiles on the highways everywhere in the State. Gross farm income of North Dakota in 1950 was nearly $610,000,000.

At Jamestown is the only independent college in North Dakota. Jamestown College, an endowed school under the sponsorship of the Presbyterian Church, is nationally known for its low fees. Here a student can work toward a bachelor's degree in liberal arts or toward a registered nurse's certificate for less than $750 a year, all expenses included—tuition, books, room and board. The college is fully accredited. On the campus this spring were about 300 students.

The college, started in 1883, was the first institution of higher learning in what is now North Dakota. In the beginning it had only one building, on a hill overlooking the frontier settlement of Jamestown.

The panic of 1893 forced it to close its doors, and the lone edifice stood deserted until 1909. That year Ihland Kroeze, a young college president from Washington State, saw the neglected building and determined to resurrect the college. He resigned his position and took the presidency of the moribund school.

When Dr. Kroeze retired from the presidency of Jamestown in 1946, the college had 14 modern buildings on its fine campus and an endowment sufficient to permit the enrollment of students at fees for all expenses half those of many schools of equal rank.

The southern part of James River Valley is one of the richest farming areas in North Dakota, second only to Red River Valley in fertility. With completion of the water program, it will be under irrigation.

It is a veritable mecca for wild fowl. Every autumn sportsmen come here from all over the country for pheasant shooting. Until recently hunters were permitted to carry large bags of game out of the State, but laws in force now have put an end to this privilege, which would soon have decimated the birds.

A Virile Land Finds Its Power

The future of North Dakota holds amazing promise. Awakening to a realization of its resources, the virile young State is building its power. It does not forget the tribulations of the past, but profits from bitter experiences. Never will it be known as a land of blizzards and dust storms.

It looks back proudly upon its victory over handicaps. Truly it is coming into its own.

Barra Taylor Hughes Graphics National Geographic, Photo by Rosemeade Photos

Artist [illegible] of the [illegible] Geographic [illegible] Adobe [illegible] for [illegible]

When Gen. Alfred Sully Crossed These North Dakota Badlands in the Sixties He Called Them "Hell with the Fires Out"

[illegible]

A Bevy from Bowmark Reigns at the State Boxes

'Have Some!' Says the Blond Queen of Memorial Day

On Fort Berthold Indian Reservation, Cowboys Drive Whitefaces Across the Little Missouri

[illegible]

The Old West Still Lives Along the Winding Streams That Flow Through the Badlands

Rancher, Blacksmith, Artist
Elmer Olstad Paints
Old West Scenes

[illegible]

Dickinson Youngsters Cavort in a Snap Selling Cowboy Gear

[illegible]

[illegible]

Indian Signs and Nature's Sculpture Enchant North Dakota Hikers

A Centennial white-tailed deer [illegible] at the foot of the Dakota Hills at the north end of Governor Fergusson Memorial Park near Sentinel.

A Sioux Indian [illegible] Indian "Writing Rock". Carvings on the 15-ton boulder are [illegible] to the world's oldest puzzle. [illegible] North Dakota. According to [illegible] Indian [illegible] Sioux [illegible] the [illegible] years ago.

Garrison Dam, World's Largest Rolled Earthfill Embankment, Will Divert the Missouri Through Eight Power and Control Tunnels

[illegible]

Scott Bassett's a Blockhouse of Old Fort Mckeen Has Been Restored as It Was in the Indian-fighting Seventies

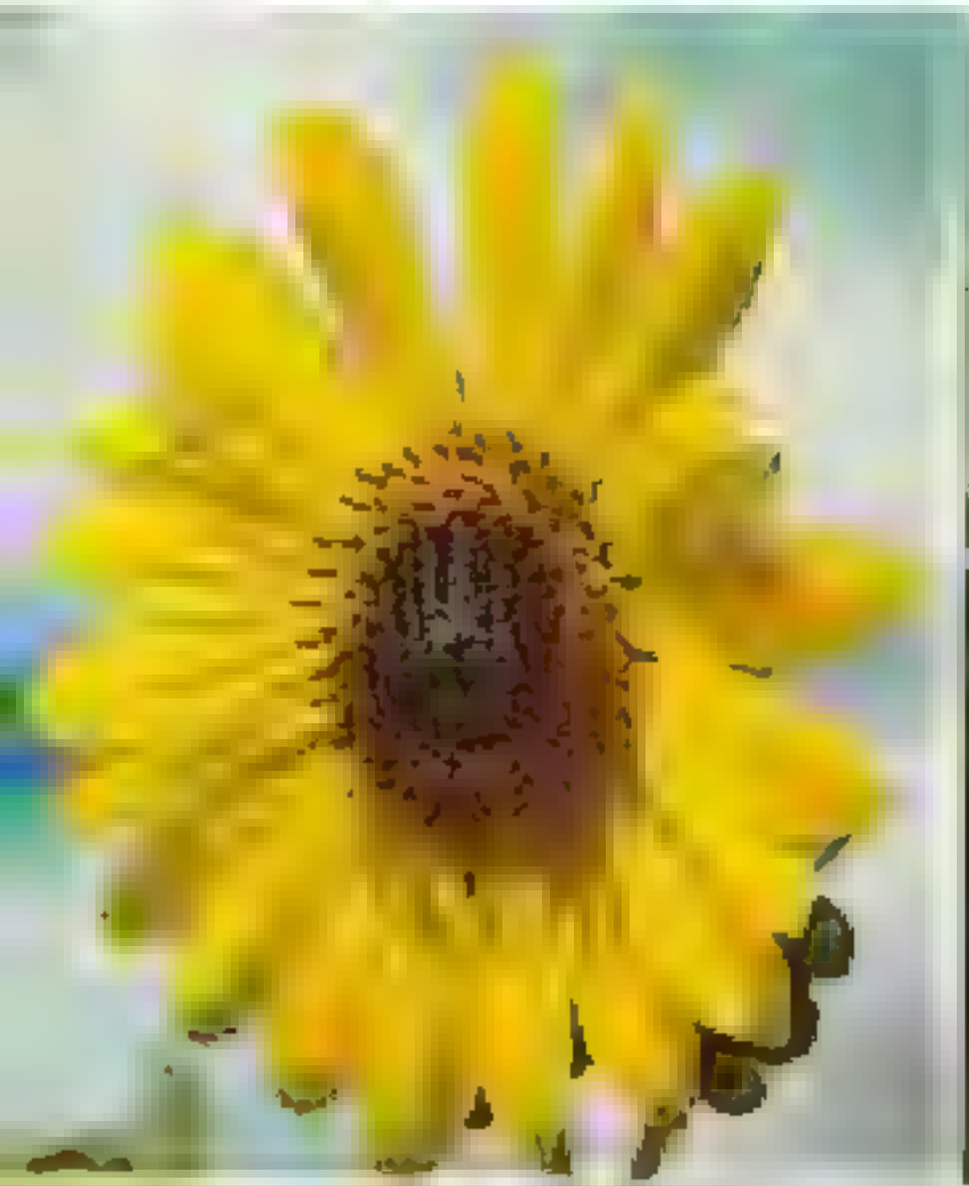
North Dakota Indians Wear Tribal Finery Only in "Dress Up"

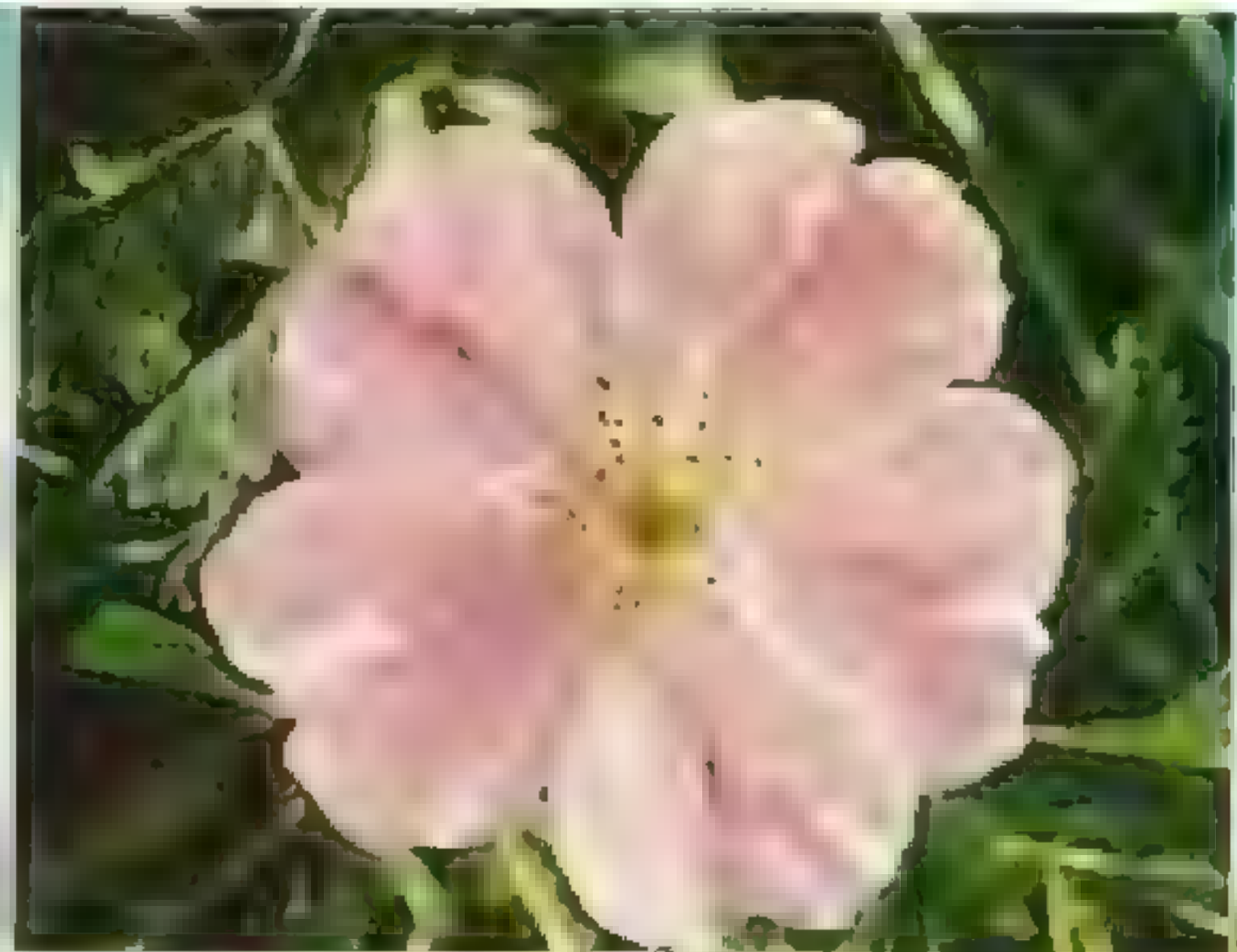
[illegible]

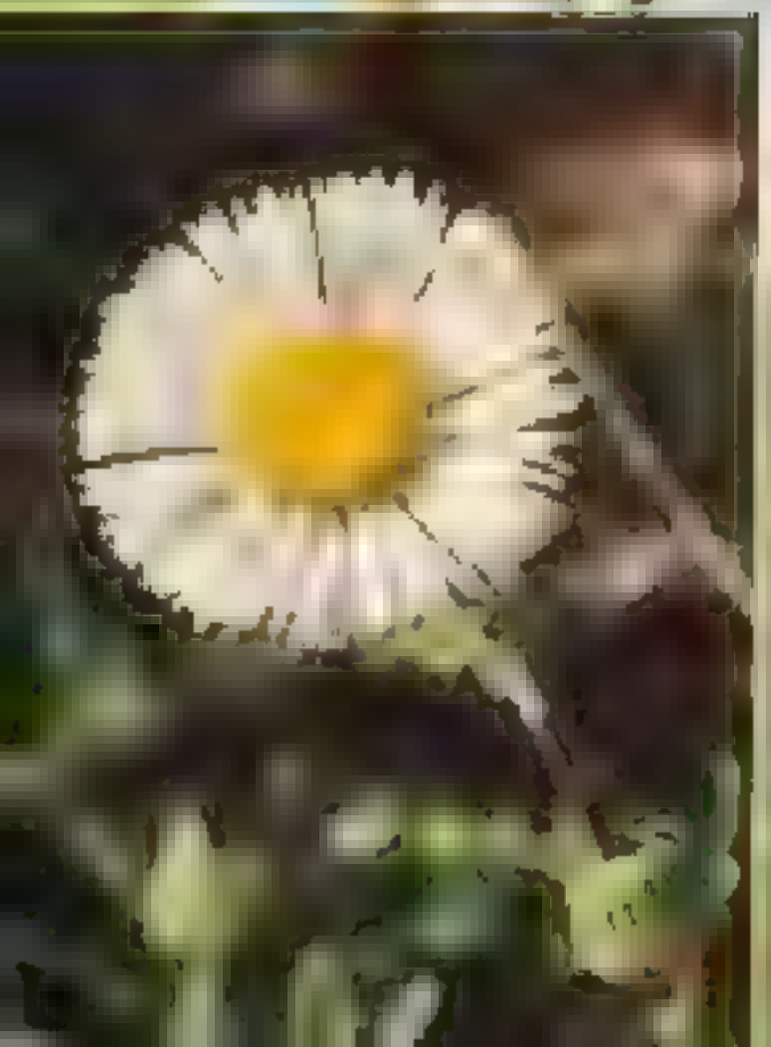
Roaring Underground, Unquenchable Flames Slowly Consume a Vein of Lignite Coal in the Badlands near Amidon

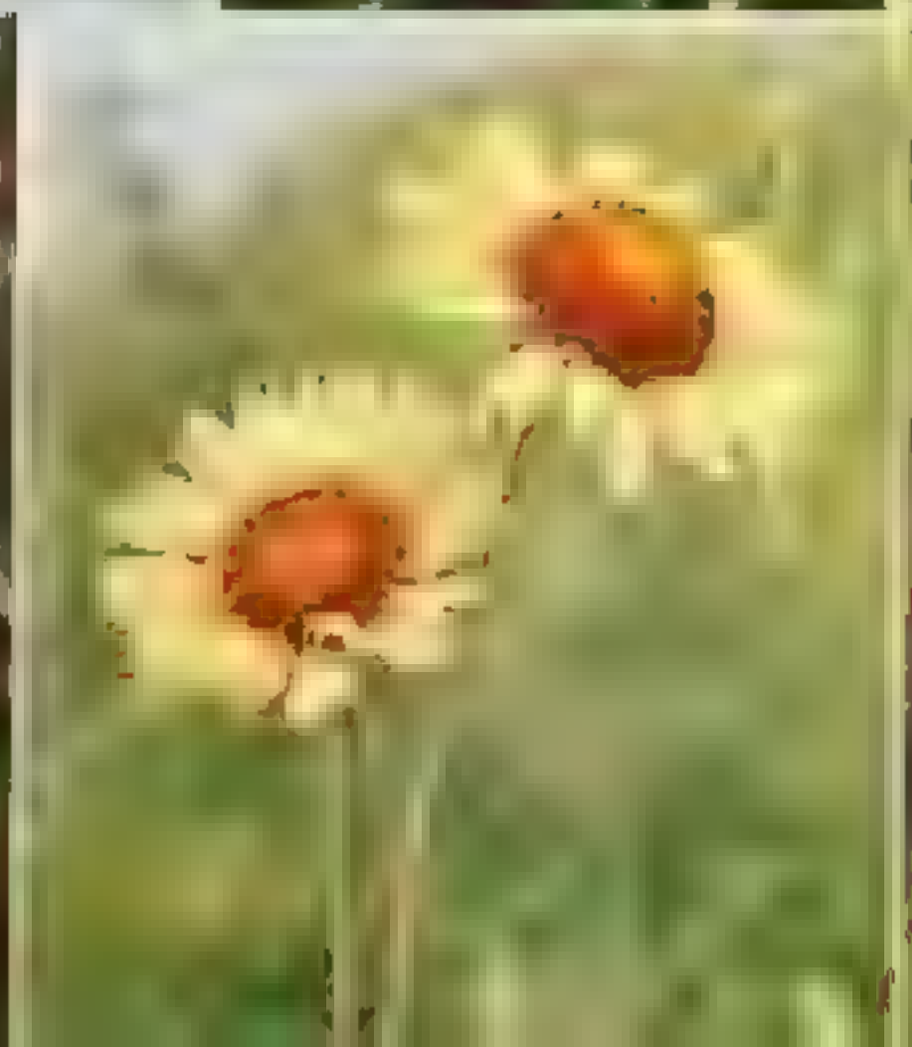
[illegible]

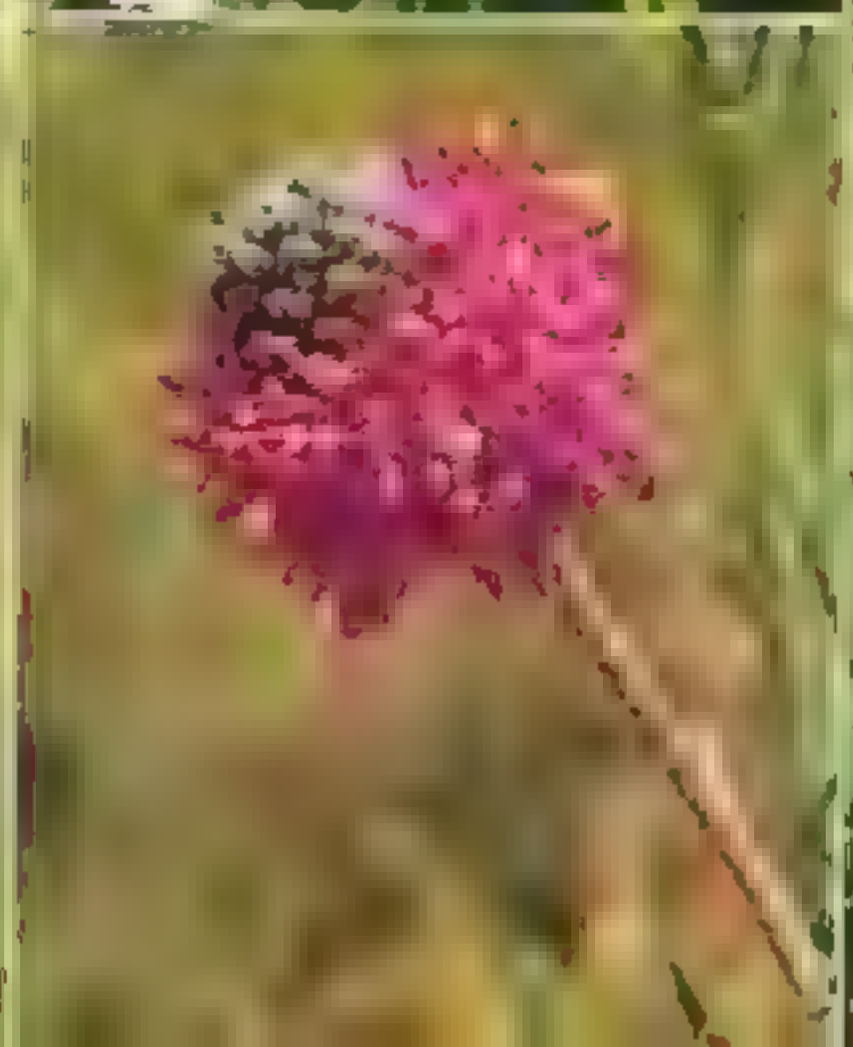
Summer Prairies Burgeon with Blooms. A Grand Forks Girl Displays the Wild Rose, North Dakota State Flower











Making a Ton of Alfalfa Meal an Hour, This Dehydrating Plant near Minot Works Around the Clock in Hot Time

Abundant Water Means Bumper Crops, New Irrigation Methods Let North Dakota Vegetables Drink Their Fill

Two Medford Oddfellows Take Tall Tales at "Neighbor Teddy"

University Hunters Shoot Off a Football Victory Fuden

The Society's New Map of Central Europe

FRONT [illegible] where the West confronts the East—is delineated on the National Geographic Society's new large-scale Map of Central Europe, including the Balkan States.*

More than two million copies of the new chart have rolled from the presses to go to member families of the National Geographic Society, who receive it as a supplement to this issue of their NATIONAL GEOGRAPHIC MAGAZINE.

Sweeping postwar changes are reflected. Many boundaries have been redrawn. Cities and towns by the hundreds appear with strange names as the result of wholesale official changes.

Area Equals Third of U. S.

In land area the 29-x-38 ½-inch chart maps a total of 1,035,000 square miles, roughly equivalent to one-third of the continental United States. But this land of mid Europe supports an estimated population of 231,000,000—a good 50 percent more than the 1950 census figures for the United States.

The new map is the second in a series designed to present the Continent in great detail. The first, issued in December, 1950, was devoted to Western Europe. The third will comprise Scandinavia, the Baltic, and the northwestern section of Soviet Russia. When the three sheets are matched they will provide a European map about 4½ feet wide and more than 5 feet high.

A companion index, listing the 10,378 place names on the new map and facilitating quick location of both the better and lesser known communities, will soon be available.

The number of place names is the largest ever to appear on an overseas-area map issued by the National Geographic Society. The Central Europe total is eclipsed only by the 11,025 place names on the new Map of the United States distributed three months ago and by the 10,437 on the sectional Map of the Northeastern United States issued with the September, 1945, NATIONAL GEOGRAPHIC MAGAZINE.

The Iron Curtain Line, twisting some 2,000 miles from the Baltic to the Turkish-Bulgarian frontier on the Black Sea, divides the Central Europe map. Behind this line lie Lithuania, seized by the U.S.S.R.; the five Red satellite nations of Poland, Czechoslovakia, Hungary, Rumania, and Bulgaria, and the Soviet occupation areas in Germany and Austria. Western Russia is covered to a line slightly east of Smolensk and Odessa.

West of the Iron Curtain lie the Allied occupation zones of West Germany and Austria, Italy, Communist but anti-Kremlin Yugoslavia, Greece, and the Turkish Straits region. In the beyond-the-Curtain area, Albania stands isolated, keeping the Soviet bloc's watch on the Adriatic.

New Names for Old, Wholesale

The epidemic of name changing that has been sweeping Central Europe, particularly its eastern half, since World War II posed a major problem for The Society's cartographers. Painstaking research was required to record correctly more than 900 new place names, which have been paired with their old designations in parentheses to aid in identification.

In that part of old Poland which was acquired by Russia, and in seized Lithuania, names have been Russianized and appear on Russian maps in the Cyrillic alphabet. To transliterate, or spell these names correctly in Latin characters, was a difficult task.

Other places have received entirely new names. The satellite nations behind the Curtain also have indulged in the practice.

Ever since the name switching began, The Society has had a steady flow of inquiries from persons seeking information on the correct name for a village, town, or city within the Soviet orbit in order to communicate with relatives, locate birth data, or for other reasons.

Mail addressed to old names frequently comes back marked "No such place." Information contained on the map also is valuable to students of current events, historians, and many others. Older maps or atlases are hopelessly outdated.

Brasov in Rumania now is called Oraşul Stalin (City of Stalin), and Bulgaria has renamed its port of Varna, on the Black Sea, for the Kremlin chief.

As a taunt, Yugoslavia has changed the name of the border station of Caribrod, on the Bulgarian border, to Dimitrovgrad, honoring the former Bulgarian Communist leader, Georgi Dimitrov, who went to Moscow for his health, according to official announcement, and did not live to return.

Lwów has not vanished entirely from Central Europe. It still appears but in parentheses. The Polish community that once bore the happy name of Łuck is in an area taken over

* Members may obtain additional copies of the new Map of Central Europe (and of all standard maps published by The Society) by writing to the National Geographic Society, Washington 6, D. C. Prices in United States and Possessions, 50c each on paper; $1 on linen. Index, 25c. Elsewhere, 75c on paper, $1.25 on linen. Index, 50c. All remittances payable in U. S. funds. Postpaid.

by the Soviet, so now it is officially called Lutsk.

Boundaries, for the most part, are officially recognized internationally. Polish and Russian frontiers are represented on the basis of treaties and claims existing as of July 1, 1951.

Recognition of some of these claims awaits Four Power agreement on a peace treaty for Germany, a prospect still remote more than six years after V-E Day.

The United States has consistently refused to recognize the legality of the "admission" of Lithuania to the family of Soviet Socialist Republics, as well as the like fate of its neighbors, Latvia and Estonia, not shown on the map.

Central Europe also has shadowy unofficial boundaries. For example, the "green frontier" is a shifting stretch along the heavily patrolled edge of the Communist sphere, across which fugitives from the Soviet frequently flee. Asked how they escaped from behind the Iron Curtain, they reply that they have arrived in the West "via the green frontier."

Reds Carved Slice from Poland

The biggest slice of land taken by the U.S.S.R. as a result of World War II was the 69,866 square miles it carved from eastern Poland. Another 19,225 square miles was annexed from Romania. Czechoslovakia's assessment was 4,921 square miles, Germany's, 4,940 square miles of East Prussia. The absorption of Lithuania added an additional 21,500 square miles.

Poland acquired 38,232 square miles of eastern Germany and southern East Prussia (by way of compensation for territory lost to Russia), plus the Free City of Danzig, representing 754 square miles.

Romania had to give up the 2,925 square [illegible] to Hungary. Hungary yielded to Czechoslovakia the Bratislava [illegible] square miles southeast of Austria's Vienna.

Albania picked up a highly strategic two-square mile piece of real estate from Italy—the island of Sazan (Saseno). Here, under Soviet supervision, a major submarine base is reported being pushed energetically toward completion.

Within the Soviet bloc, further readjustments of present frontiers may continue for some time to come. Best indication of this is the recent deal whereby Poland traded agricultural land on its eastern border, just across from the Lvov-Kovel area, in exchange for Soviet oil-bearing territory west of Drogobych. As a result, the important Lvov-Kovel rail line no longer passes through a jutting spur of Polish territory.

Searchers will scan the new chart in vain for St. Joachimsthal (St. Joachim's Dale), the name that has identified a historic Bohemian mining town on maps for centuries. At St. Joachimsthal, in 1516 an extremely rich silver mine was discovered. The feudal lord of the area had many coins minted from the silver. The first struck were dated 1518, and, since they bore a likeness of St. Joachim, people referred to them as *Joachimsthaler*. Before long the Joachimsthaler became *thaler*, with such variant forms as *daler*, *dalar*, and others.

When England learned of the new coin circulating in Central Europe, the first mention of it in English was "dollar."

Czechoslovakia has renamed St. Joachimsthal. It appears on our map as Jachymov, and its mines are the major known supplier of uranium for Russia's A-bomb program.

The Soviets are reported working other uranium mines in the Thuringia-Harz Mountain areas of East Germany, and a new field [illegible] in Poland's Lower Silesia. But none of these compares with Jachymov's deposits of high-grade pitchblende (uranium ore), which are the most extensive in Europe and among the largest discovered to date in the entire world.

Ironically, the Joachim in whose honor the mining village originally received its name was the father of the Virgin Mary, whose Son is known as the Prince of Peace.

Historic East-West Battleground

For thousands of years the area of this map has been a meeting place and battleground between East and West. The flat plains of Poland and the land bridge of the Balkan Peninsula provide natural thoroughways over which invading hordes have spilled out from the Asian land mass into Europe, or European conquerors have tried their luck against the vastness of Asia.

Like the new Map of Western Europe, the new chart is drawn on a scale of 1:2,500,000, or 39.46 miles to the inch, and was made on the same Albers Conical Equal-Area projection.

One inch on the map represents a ground distance that would be covered by a one-hour automobile drive at 40-mile speed. In this space four to six towns are named, so that a traveler using the chart will find a complete coverage of all cities and towns of importance, together with a clear picture of their transportation facilities.

Extensive road and railway changes which mark postwar reconstruction programs are shown. Road networks appear in red, rail lines in black. Red stars designate major airfields.

How Fruit Came to America

By J. R. Magness

Director of Horticultural Research, United States Department of Agriculture

With 24 Paintings by Else Bostelmann

"JOHNNY [illegible] here's a dollar. Run buy me a can of fruit salad, and bring me the change."

Johnny knows where to go—the grocery store around the corner. It doesn't occur to him to ask where the grocer gets fruit salad. But if it should, the grocer, too, would know the answer—from the wholesaler, who, of course, buys it (at a discount) from the packer. Obviously, it's a simple matter to trace a fruit salad back to its source.

Or is it?

Where did the packer get it? Here the story becomes complicated. Suppose the canned salad contains just a handful of the commonest fruits: part of a pear, a few grapes, half a dozen sweet cherries, a piece of pineapple, and a few slices of peach. At home, Johnny's mother may garnish these with a little fresh apple, grapefruit, or orange.

To track just these few to the places where they are grown today would take much travel. The apple is likely to have come from Virginia, New York, Washington State, or perhaps from the Midwest, near the Great Lakes; the cherries are probably from Oregon or Washington; the grapefruit and orange from Florida or California; the peach, pear, and grapes from the Pacific coastal area; and the pineapple all the way from Hawaii.*

Most Fruits Are Newcomers

But that is still only half the story. Peaches didn't always grow in California, nor apples in Washington. In fact, 500 years ago—before the first white settlers came—only the grape of all these common fruits had ever been seen or heard of in what is now the United States.

The rest got here only after toilsome journeys lasting tens of centuries and starting in the farthest parts of the world. Peaches and oranges came to us from China; it took them about 4,000 years, perhaps longer, to finish the trip (pages 334 and 352). Apples, pears, and sweet cherries first appeared in the fertile, temperate, hilly land around the Black and Caspian Seas (pages 330, 332, 343, and 345); ancient civilizations there and in Europe knew and ate them centuries before Columbus, or anyone else, thought of sailing west to get to India.

Grapefruit? Five centuries ago there weren't any. There was, growing in the East Indies, a big, tough fruit, the shaddock. Eventually—sometime in the 1600's—it was to make a long voyage in a trading ship bound for the West Indies. There, by one of those strange tricks of Nature we call mutations, it would turn into a fruit like the one in our salad bowl (page 354).

Pineapples started in the Western Hemisphere [illegible] Columbus found them growing in the West Indies. But even this fruit had moved halfway across the Pacific before it was sent to our fruit salad packer (page 365).

The fruits we grow in America, in other words, didn't just spring up here naturally. They had to travel to get here, which, of course, is also natural, since Nature designed fruit especially to travel.

Why You Should Not Eat the Apple Core

A man, going for a walk, plucks an apple from a tree, munches it as he walks, and then throws away the core. From the man's point of view, eating the meat on the apple is the important part of this operation. To the tree, however, the important parts are that he walked, and that he threw away the core.

In the struggle for survival, plants, like animals, have worked out tricks and devices to spread their seed. Or, putting it backward (but more accurately), those plants on which no such device evolved were very likely to die out. Some developed seed pods which open explosively, scattering seeds for yards around. Others, like the dandelion, grew seeds on tiny parachutes which float in the wind; still others evolved seeds which can survive long, wet trips in ocean currents.

On fruit plants, however, a different method of propagation evolved. Their seeds were covered with a layer of pulp or flesh which attracted animals and men because it was nourishing or had a pleasant flavor. Often, too, the skin covering the pulp was bright-colored and attractive.

It is no accident that berries and cherries have been among the most widely distributed plants since prehistoric times. Their fruit was especially suited to birds, which could carry the seed farthest and fastest.

At first, men, like the other animals, simply picked and ate the wild fruit, propagating it

* See "Because It Rains on Hawaii," by Frederick Simpich Jr., National Geographic Magazine, November 1949.

† See "Papa, the Pineapple's Ancient Ancestor," by Mildred H. Foster, National Geographic Magazine, October, 1950.

Two Young Fruit Merchants Test Their Grapes on a Hungry Customer

[illegible]

accidentally.* As time went on, however, they learned to dig holes and plant the seeds instead of discarding them, and to keep weeds and other plants cleared away from the spot where the new fruit was to grow. This was the beginning of horticulture.

Primitive man quickly learned, too, to pick out the seeds of the best plants—those which bore most abundantly or produced food with the best flavor. This was scientific breeding in its earliest stages.

He found that with most of the plants we now classify as vegetables, this system worked fairly well. These are the crops that we plant afresh each year from seed, and which generally mature in a single season. They come fairly true from seed, that is, the offspring of any plant usually resemble the parent.†

With fruits, however, this didn't work so well. One distinguishing feature of all the crops we commonly call fruits is that they grow on plants that live and produce for a number of years. Many of them, in fact, must grow for several years before they bear fruit at all. This makes seed selection a slow and tedious process. Also, most of them do not come true to seed.

These early horticulturists soon found out that seed of a superior fruit tree—a peach, an apple, a pear, or almost any other—might or might not produce trees as good as its parent. More often it did not. And so men worked out a third important step in the science of fruit growing, what is now known as "vegetative propagation."

This was based on the discovery, made long before there were any historians to record it, that it was possible to plant a branch rather than a seed from a fruit tree. Sometimes the branch, or cutting, could be set directly in the soil, where it sprouted new roots. More often it was "planted," or grafted, into the stem of another and similar tree, letting the already growing roots supply it with food from the soil. In other cases, "suckers" instead of cuttings were planted, or even sections of roots.

Millions of Bushels from One Tree

The important fact was that whenever a tree or bush was propagated in this way, the new plant produced fruit with exactly the same characteristics as the parent; it was, literally, a "chip of the old block."

Today virtually all of the cultivated fruit we eat is taken from plants propagated in this way. For example, one of our most popular apples, the Winesap, has spread across the country by means of twigs or shoots budded or grafted into seedling apples. These shoots all trace originally to a single tree discovered more than two centuries ago. Because this one tree bore superior apples, it was transformed into thousands of trees which have produced millions of bushels of fruit (page 330).

If you eat grapes of a popular variety known as Thompson Seedless, you are eating fruit from a plant which first sprouted almost 1,000 years ago.

Naturally, the earliest selection and culture of fruit took place in areas where man first moved haltingly toward civilization. Thus it is not surprising that, of the cultivated fruits we know today, the largest number can be traced to two broad areas where the oldest civilizations grew up.

One includes the settlings of southeastern Europe and southwestern Asia stretching from the eastern Mediterranean to the Caspian Sea. From here, in addition to apples, came pears, cherries, figs, olives, and most of our plums and grapes.

The other is the part of central and southern Asia that stretches from China through Burma and eastern India southeast into the Malay Archipelago. There, thousands of years before the Christian era, men were eating and learning to cultivate peaches, apricots, bananas, mangoes, and, a little later, oranges and lemons.

"American" Varieties Grow Up

As men and civilization spread from these areas through Europe and eventually around the world, they took their improved fruits with them, either as seeds or plants. When America was settled, the choicest kinds of fruits from Europe were transplanted to our shores.‡ Even though the art of grafting was well known, and some grafted trees were brought over, most of the earliest plantings were seedlings. The Indians in many cases secured seed of the European fruits and planted them about their villages. Thus, along with the earliest white settlements, and progressing westward even in advance of the settlements, groves of fruit trees, mainly seedlings, became established.

These seedling trees were highly variable. Occasionally one would be found bearing unusually good fruit. As the country became settled, these superior trees were propagated, given local names, and more or less widely tested. Many of our present varieties began this way. Others have been brought in direct from older countries.

Not all the improvement and selection of varieties have been due to chance or to impor-

* See "American Berries of Hill, Dale, and Wayside," National Geographic Magazine, February, 1919.

† See "Our Vegetable Travelers," by Virgil K. Boswell, National Geographic Magazine, August, 1949.

‡ See "The British Way," by Sir Evelyn Wrench, National Geographic Magazine, April, 1949.

tations. Beginning a little more than a century ago, an intense interest in fruit-tree breeding developed in this country. Private individuals began to cross varieties, grow the resulting seed to fruiting, and evaluate the fruit they got. Greatest interest was displayed in grapes, strawberries, raspberries, and American plums, but all fruits received some attention. Many excellent varieties resulted from such efforts.

A little later, after the State agricultural experiment stations and the U. S. Department of Agriculture were organized, a number of such Government-supported stations began fruit-breeding work. This made possible the development of more extensive and longer-range work than could be conducted by private people.

Today a more extensive program of fruit improvement than ever before is under way in this country. Using new techniques discovered by geneticists, breeders sometimes even alter hereditary characteristics of the plant cells themselves and produce hybrids of plants which could never have been crossed naturally.

In this way they work to combine qualities such as superior flavor, large size, and abundant production with others like resistance to disease, hardiness to cold, and late (or early) ripening. Production of just a few greatly improved varieties of berries, plums, apples, or grapefruit may pay the cost of research many times over.*

The War Against Pests

Unfortunately, as fruits and fruit plants moved from continent to continent, they did not always travel alone. With them, hidden in the fruits themselves or in the leaves, bark, or roots, sometimes rode insects or their eggs or larvae. Other stowaways were the fungi, bacteria, and viruses which cause plant diseases.†

Often, too, in the new land to which the fruit moved, new pests were waiting—pests to which they had developed no resistance. As transportation improved and commerce increased, it became less and less easy to keep these bugs and blights localized.

A good example is the phylloxera, or root louse, which feeds on the roots of native American grapes. Here it causes little damage, the American plants are largely resistant to it. Taken to Europe, however, probably on the roots of American vines, it threatened to wipe out Europe's great grape and wine industry. The European vines were saved only by grafting them on the roots of American grapes, a practice still followed today (page 343).

A more familiar example to most American gardeners is the Japanese beetle. About half a century ago it was transported from Asia to the eastern United States. There, in the absence of natural enemies, it spread steadily. It still causes heavy damage to crops.

A virus disease of citrus, apparently carried in trees from Africa, has destroyed a large portion of the citrus orchards of South America. These must now be toilsomely replanted on rootstocks resistant to the disease. In recent decades strict regulations have been set up to control the spread of such diseases and pests to the United States.

Thus men, having undertaken the job of propagating and breeding fruit trees in order to harvest their food, have also been forced to take over a large part of the fight against their insect and disease enemies. The modern orchardist must know these pests—their life stories, how they pass the winter, when they invade the foliage and fruit.

He must know what materials to use and when to spray to control specific insects and blights. He uses mechanized equipment costing thousands of dollars to protect his trees. This includes power sprayers which can pump gallons of fluid a minute over wide areas, and even planes and helicopters to fly low and dust treetops.

The cost of such equipment, combined with the superiority of the fruit it helps to produce, has tended more and more to concentrate fruit growing into large commercial enterprises, gradually squeezing out the small, local farm orchard and the back-yard grower.

With such heavy investments, commercial fruit growers can ill afford to lose a season's crop to frost, drought, heat, or humidity. Thus they confine their operations to areas where climate and water supply are dependable and best suited to the individual fruit.

This tendency to concentrate large orchards in fairly limited areas has led, in the past few decades, to another revolution in the fruit industry. It is mainly concerned with the problem of getting the fruit from the grower to the market.‡

To move fresh fruit to consumers while it is still fresh, there are now fast freight trains and vast fleets of refrigerated railroad cars and trucks.

Our can of fruit salad represents another solution. Largely in the last half-century, commercial fruit canning in the United States has grown to vast proportions. Americans

* See "Patent Plums Enrich Our World," by Orville H. Kneen, National Geographic Magazine, March 1948.

† See "Our Insect Pests Go Global," by Frederick G. Vosburgh, National Geographic Magazine, August, 1941.

‡ See "Revolution in Eating," by J. R. Hildebrand, National Geographic Magazine, March, 1943.

Sting California Olives Ride Past Critical Eyes on Their Way to the Packer

[illegible]

now [illegible] pounds of canned fruit [illegible].

Even [illegible] the growth of the frozen-food industry. Quick freezing of fresh fruit for home use began [illegible] only about 20 years ago. Most of the [illegible] has taken place in the past decade. Today the [illegible] Americans will consume more than [illegible] pounds of frozen fruit. [illegible] Week Mar. 11, [illegible] one-fourth of our average production [illegible].

[illegible] and milk [illegible] your congregation [illegible] or his fruit trees and vines and pickles [illegible] preserving the fruit they [illegible]. In return he gets a large food crop which supplies him with a large [illegible] of his vitamins, [illegible] nutrients he must eat to [illegible] healthy.

[illegible] are lucky to have within the borders of their country a wide variety of soils and climates suitable for growing fruit. Hints of [illegible] patterns and [illegible] are presented on the following pages, and four are shown extensively in the Tables section.

The Pacific States are probably [illegible] the Pacific Northwest [illegible] are ideal for orchards and vineyards and [illegible] produce most of the Nation's fruit.

This year [illegible] Americans [illegible] 200 pounds of [illegible] fruit [illegible] which makes you [illegible] the biggest consumers in the world [illegible].

* [illegible] *The Fruit Industry*, by Ira J. Condit; *Fruits*, by Maxwell O. [illegible]; *Fruit Growing*, by [illegible] Weber and L. D. [illegible]; [illegible] from the U. S. Department of Agriculture.

The Apple Is King

IN the United States in a good year about a bushel of apples is grown for every man, woman, and child in the country. There is no State in the Union—and hardly a temperate land in the world—which does not grow apples to some extent. They bloom throughout Europe and across Asia—in Russia, Siberia, China, Korea, and India; they are picked and eaten in Japan, Australia, New Zealand, and South America.

The apple's popularity is not all due to its flavor, which seems equally effective raw or in a steaming deep-dish pie. Just as important is its hardiness. Many varieties can stand temperatures down to 40° below zero F. and will also grow in warm climates, provided that there is a moderate winter to give the trees a rest. Thus it can thrive in areas where few other fruit trees survive.

America regards the apple and the apple pie as its own, producing more of both than any other country. Actually, the fruit is an immigrant. It came, along with the first white men, from Europe.

Apples Were a Stone Age Crop

There are many species of apples, or crab apples, but the one from which our present varieties were developed, *Malus pumila*, probably started in southwestern Asia in the area from the Caspian to the Black Sea. Long before recorded history begins, however, apples had spread across Europe. The Stone Age lake dwellers of central Europe used them extensively. Remains found in their habitations show that they not only stored fresh apples for eating but also preserved them by cutting and drying in the sun.

Cultivation of the apple apparently started with the beginning of agriculture in Europe. The Greek writer Theophrastus mentions a number of varieties grown in Greece in the 4th century B. C. And according to mythology, an apple (albeit a gold one) was awarded to the goddess Aphrodite in what may have been the world's first beauty contest.

At the time of the discovery of America, apples were central and northern Europe's most important cultivated fruit. Not surprisingly, they were taken along by the first settlers to the temperate regions of the New World—by the English to Virginia and New England, the Dutch to New York, and the French to Canada.

Once started, seedling apple plantings moved west faster than the white settlers did. Some Indian tribes planted orchards around their villages. John Chapman, an itinerant missionary better known as Johnny Appleseed, roamed Ohio and Indiana early in the 19th century teaching the Gospel and planting apples. Apple seeds were planted at Vancouver, Washington, as early as 1817.

Though their ancestors came from Europe, most apple varieties now popular in America started as seedling trees developed here. The apple does not come true from seed: 100 trees grown from seed of a single tree will all differ from each other and from the parent. Thus occasionally a chance seedling found in a pasture or fence row will prove better than the varieties previously known. When this happens, if the new tree is discovered, named, and propagated by grafting or budding, it becomes a new variety.

In a fruit-growing community, such a discovery is not unlike finding a new oil well or a gold mine. Grateful citizens may even erect a monument to mark the site where a new apple was born. A tall memorial pillar, topped with a huge stone apple, marks the spot where the first Baldwin apple tree was found in Wilmington, Massachusetts. Another, in Dundas County, Ontario, Canada, shows where one John McIntosh stumbled on the apple that bears his name while clearing forestland.

These and some of our other important varieties, like the Winesap and Yellow Newtown, date back to colonial days. Others are more recent; the famous Delicious, for example, was discovered a little more than half a century ago in Winterset, Iowa.

Greatest centers of commercial production in the United States today are in the irrigated valleys of the Pacific Northwest, particularly Washington; in the areas south and east of the Great Lakes—in New York, Ohio and Michigan; and in the foothills and valleys east of the Appalachian range, from North Carolina to New England. Commercial orchards produce about 120,000,000 bushels of apples a year; total production, including home garden trees and small farm orchards, may run as high as 150,000,000 bushels.

Crab Apples, Small and Sour

The name crab apple is popularly applied to trees that give small fruit (½ inch to 1½ inch diameter), usually very acid and tart in flavor. These may be "native" (unimproved) species, or crosses of small-fruited species with cultivated varieties. A good many kinds of crab apple aren't grown to eat at all but as flowering shrubs.

Most crab apples grown for fruit in this country started as crosses of the Siberian species *M. baccata* with standard apples, and are generally called Siberian crabs. They are particularly popular in Canada because they are extremely hardy and early ripening. In northern Europe many varieties of crab apple are grown for making cider. American housewives like them for pickles and jelly.

Apples, Native to Southwest Asia, First Came to America with Early Colonists

Scientists have traced the ancestry of the modern apple to a wild species native to the mountains of southwestern Asia. Apples were among the earliest cultivated fruit trees in North America, and were grown in orchards by the early 1600s.

Pears and Quinces: Butter and Jelly

"WHEN you dive into a pear," a fruit lover once remarked as he tucked in his napkin, "you never know whether you're going to strike water or sand."

The great variation in pears sold in our markets—from the softest, juicest of fruit to one of the hardest and grittiest—can be blamed chiefly on a tiny bacterium with a unusual name, *Erwinia amylovora*. Except for *Erwinia*, the gritty sand pears probably would not be grown in the United States to any extent.

The common pear, *Pyrus communis*, like its cousin, the apple, seems to have come originally from western Asia and near-by Europe. Like the apple, it was used as food by Stone Age men and improved by the prehistoric Greeks. The conquering Romans carried it with them into the temperate parts of the Old World.

When America was discovered, pear culture was common throughout Europe, and pear seed and some trees were brought over by the earliest colonists. At first, like the peach and the apple, the pear trees thrived and produced abundantly in the new land. As early as 1771 the famous Prince Nursery on Long Island, greatest of colonial fruit nurseries, listed 42 varieties of pears.

Belgians Breed for Butter

Meanwhile in Europe, particularly in France and Belgium, horticulturists were striving to produce new and better varieties of pears. In the 18th and 19th centuries many breeders named superior types, though two deserve particular credit. Nicolas Hardenpont (1765-1841), a priest in Mons, Belgium, grew quantities of seedling trees and produced the first of the varieties having the soft, melting flesh that gave the best pears the nickname "butter fruit." Later, Jean Baptiste van Mons (1765-1842), a Louvain, Belgium, physician, developed pear breeding on a large scale and helped popularize some 40 superior types.

But as the improved varieties made their appearance in American orchards, so did *Erwinia amylovora*. These bacteria invade the bark, roots, and other soft tissues of the tree, causing oozing cankers and giving the infected parts a scorched appearance which accounts for the popular name of the disease, fire blight. It kills off large limbs and eventually whole trees. Fire blight was first observed in America as early as 1780, but it was not until a century later that Dr. Thomas Jonathan Burrill, a University of Illinois plant pathologist, worked out the cause.

Unfortunately, no one has yet worked out an effective control, and down to the present day pear blight makes growing the high-quality "butter" pears of Europe extremely hazardous in most of the United States east of the Rockies.

In eastern Asia another kind of pear had developed, *P. pyrifolia*, hard of flesh and with numerous "sand" or grit cells. These sand pears, still widely grown in China and Japan, reached the United States before 1830, by way of Europe. They proved quite resistant to fire blight, also to the teeth and palates of the consumers.

Softer, but Still Sandy

Hybrids of sand pears and European varieties soon appeared, starting as chance seedlings where trees stood adjacent in orchards. The most important of these, the Kieffer, first fruited in 1873. Hybrids are now grown extensively in the eastern half of the United States; they are blight-resistant and better to eat than the original sand pears, but still inferior to the best European kinds. In recent years research has been started to breed better blight-resistant varieties for eastern use.

In the mild, dry-summered valleys of California, Oregon, and Washington, the best European varieties grow near to perfection. From here come most of the commercially grown pears used for canning and for sale as fresh fruit—about two-thirds of the annual national crop of 50,000,000 bushels. Millions of bushels from these three States have been shipped back to the Low Countries of Europe, whence their ancestors came.

Pears are an important crop in all of the temperate parts of Europe. Total production there averages about 100,000,000 bushels a year. France, Germany, Italy, and Switzerland lead in production. In France, particularly, many pears are made into perry, a fermented pear cider. Argentina and Australia are also among the important producing countries.

The Sour Quince Makes Good Jelly

To most Americans the quince (*Cydonia oblonga*) is just a name on a jelly jar or a nugget in a fruitcake. Closely related to the pear, it appears to be native to northern Persia, was known in Greece and Italy long before the Christian Era, and was brought to this country by the earliest colonists. For a time its low, gnarled trees were widely grown in back yard orchards. It has since fallen into disrepute, so much so that in American slang "quince" denotes a particularly unpleasant or sour person, usually female. A few small commercial plantings suffice the steady domestic demand for preserves and flavorings.

From Kashmir to Western Europe, Pears and Quinces Grew Wild Before History Began

[illegible]

The Peach, Most Versatile of Fruit

WHAT fruit besides the peach can be eaten whole like an apple, sliced with cream, dried, stewed, pickled, spiced, canned, distilled into a fine liqueur, cooked into pie or jam—or frozen into delicious ice cream?

Partly due to its amazing versatility, partly because its flavor and texture are unsurpassed, the peach ranks near the top in popularity in the United States. In recent years annual production has averaged more than 70,000,000 bushels. It is also extensively grown in Europe, Asia, South Africa, Australia, and South America. Despite trouble with diseases and insects, it is much grown in small orchards and even back yards. In fact, some of the best ripe-skinned, soft-fleshed varieties, like the Cumberland and Golden Jubilee, are so delicate they may be damaged in handling and shipping, and are best grown where long trips to the market are not necessary.

Americans show their high regard for the peach in symbolism. To tell a young lady she has a "peaches-and-cream" complexion is a high compliment; to describe the lady herself as a peach is also flattering, if less subtle.

The Chinese thought the peach was symbolic. Some early Chinese writers called it the tree of life, others the tree of death; still others thought it symbolized longevity. The pink peach blossom, for some reason, was associated in ancient China with feminine promiscuity, and all growers were warned against planting peach trees near the windows of a lady's boudoir.

How a Name Misplaced a Fruit

The word "peach" is based on a Latin word meaning Persian. The scientific name, *Prunus persica*, also implies origin in Persia; peaches, in fact, used to be called "Persian apples." Thus for more than 2,000 years the native home of the peach was believed to be Persia. This belief, however, has not stood up under scientific scrutiny in the past century.

In tracking down the origin of a plant, scientists, like detectives, must piece together a variety of clues. One hint that Persia was not the home of the peach was the fact that there was no mention of the fruit in early Hebrew literature or in Sanskrit; this would indicate that it was unknown in the area from Persia to western India about 1500 B. C.

Looking farther east, botanists found peaches of a number of types which appeared to be native over large areas of China, with all the characteristics of the western fruit. Moreover, peaches are mentioned in Chinese literature earlier than 2000 B. C.

Most recent students therefore agree that China is undoubtedly the native home of the peach. The range of the species probably was wide, extending over much of the country from Turkistan as far as the eastern coast.

Once its home was settled as China, it was comparatively easy for botanists to trace the fruit's slow progress westward. Exactly how and when it reached Persia is unknown, but it probably traveled from China along caravan routes used in the pre-Christian Era. By 332 B. C. it had reached Greece, where a Greek writer described it as a Persian fruit. Virgil (70-19 B. C.) was the first Roman to mention the peach. Its culture spread all over the temperate parts of Europe in the centuries that followed.

The Spaniards probably planted the first peaches in the New World; by 1571 three types were growing in Mexico. The French in Louisiana, the English at Jamestown, the Pilgrims in Massachusetts and others planted peaches as soon as their settlements were established. The Indians, always alert to new food supplies, carried them inland far in advance of white settlements.

Practically all varieties now grown in this country started here, most of them through chance discovery of superior trees among the many seedlings. Within the past 50 years Government experiment stations, both State and Federal, as well as some private researchers, have been systematically breeding peaches to develop good-quality varieties.

The peach is not one of the hardiest fruits. Fruit buds are often killed by winter temperatures of 10° below zero F., and temperatures down to −20° F. will frequently kill trees. Most varieties also need a fairly long winter dormant season to start growth normally in spring. In the United States, peaches do best in the Pacific Coast States, especially California, along the Atlantic seaboard from Georgia to Massachusetts; and south and east of the Great Lakes—in New York, Ohio, and Michigan.

Nectarine, the Same Fruit, but No Fuzz

The nectarine, not widely known in the United States, is a smooth-skinned, or fuzzless, peach. It [illegible] the same as a peach in tree, leaf, or flower. Fruits are similar in shape, in pit, or stone, and both have varieties that have white, yellow, or red flesh color. Nectarines are usually somewhat smaller, firmer-fleshed, more aromatic, and have a distinct flavor often richer than the peach. They originate as true breeding mutations of the peach and have been esteemed in Old World countries for more than 2,000 years. But, because their smooth skin makes them vulnerable to insects, disease, and cracking, they are not as successful as peaches in the humid eastern United States. They reach our markets in limited quantities, mainly shipped from the western States.

Peaches Were Cultivated in China More than 1,000 Years Ago

[illegible]

Two Stone Fruits from the Orient

APRICOTS and Japanese plums are two more of the great group of stone fruits, or drupes, which include fruit ranging in size from the cherry to the peach, all containing a single hard, woody pit. These two are considered together because they are both believed to have originated in China. Their routes around the world, however, were quite different, as are the ways in which they are eaten.

The apricot, though juicy and aromatic when fresh, is one of the fruits which most Americans seem to prefer dried or canned. Of the more than 200,000 tons a year grown in this country, about 40 percent are dried, 40 percent are commercially canned, and 20 percent are sold fresh.

The apricot reached the Mediterranean countries before the time of Christ. It has been claimed that Alexander the Great carried it to Greece at the time of his conquest of southwestern Asia, in the 4th century B. C. It was long said to have come from Armenia, hence the botanical name *Prunus armeniaca*, by which it is known to this day.

More recent botanical and language research, however, has indicated that the original home of the apricot was not southwest Asia, as long believed. There is no name for the fruit in either the Hebrew or Sanskrit languages, as would be expected if the fruit was present in the area when these languages were developed.

On the other hand, the Chinese used a character believed to represent the apricot in writings earlier than 2000 B. C. Also, in China today apricots are found which have all indications of being truly indigenous.

Believed to Be Native of China

It is now generally believed that the apricot originated in central and western China, and that it had been carried to southwest Asia before the time of Alexander the Great. Pliny states it reached Italy about 100 B. C. It had spread throughout the temperate parts of Europe, including England, before the discovery of America.

The Spaniards apparently took the apricot to the New World with the earliest settlements. It thrived in the drier parts of Mexico. Seedlings were planted in California at the Spanish missions in the 18th century, and named varieties from Europe were introduced before 1850.

The English also established apricots in Virginia; Capt. John Smith reported in 1629 that apricots were thriving there. However, the apricot has never proved well adapted to the climate of the eastern United States.

The name "apricot" comes from a Latin word *praecoquum*, meaning early ripe. Because it blooms very early in the spring, its blossoms are almost always killed in the East by spring frosts. The fruit also tends to crack badly and decay in warm, rainy weather.

Apricot growing in the United States is therefore largely confined to the area west of the Rockies, with California producing by far the largest part of the crop. Washington, Oregon, and Utah also produce commercial quantities of apricots.

Burbank Promoted Japanese Plums

Little is known of the background of the highly colored, juicy, spicy plums of the species *P. salicina*, known in this country as Japanese. Certain it is that they did not originate in Japan, no plum species is native there. Japanese horticulturists say they were introduced into Japan from China some 200 to 400 years ago. It seems almost certain that their native home is in China, perhaps in the southwest part, a region little explored by western botanists.

These plums first reached America about 1870, trees from Japan were imported in that year by a fruit grower of Vacaville, California. They quickly attracted attention, and commercial propagation soon started.

Luther Burbank, the great plant breeder, who moved from Massachusetts to California, imported many kinds, grew numbers of seedlings, and highly publicized the fruit. He gave American names to imported varieties and to selections from his seedlings. More than any other man, Burbank was responsible for the rapid spread and great interest in Japanese plums.

These plums apparently were unknown in Europe prior to their introduction into this country. In recent years they have been widely tested in temperate countries throughout the world.

Hybrids May Be Important

In this country they are grown to a limited extent in many of the States. They are early blooming, and the blossoms are subject to killing in areas where spring frost occurs frequently. On the other hand, they stand summer heat and rain better than the European plums, and are of better quality than most of our native kinds. They will cross readily with most kinds of native American plums, and promising varieties are being developed from such crosses.

Commercial production is most extensive in California. The large, highly colored plums on fruit stands and markets from mid-June through August are mainly varieties of the Japanese, or, more accurately, Oriental plums.

Seeds and Japanese Plums Traveled East and West from China

Asiatic Plums Grow in a Bewildering Variety of Shapes, Colors, and Sizes

[illegible] Asian plums are the Kinkenape and large yellow Egg plums, both native to western Asia. [illegible] and purples become prunes. Tart blue Damsons, from Europe, make [illegible]

Plums and Prunes from Europe and West Asia

MOST important commercially of the plums grown in the United States are those which came here from southwestern Asia by way of Europe. These are of the species *Prunus domestica*, of which three main types lead in production here.

First in quantity and market value are the drying plums, or prunes. These are fairly large, firm-fleshed, meaty plums with a high sugar content. They can be dried without removing the pit. In the sun or in dehydrators, these are dried in tremendous quantities and form our familiar dried breakfast prunes. More than 200,000 tons a year of these are shipped from western States, chiefly California.

Some varieties of this type are also widely used as fresh fruit, and many are also canned. Production centers for these two categories are Oregon, Washington, and Idaho.

The second type of European plum is popularly called the Greengage or Reine Claude group. These fruits are nearly round, light green to golden yellow when ripe, and the flesh adheres to the pit. They are generally softer fleshed than the prune group and are not suitable for drying. Many varieties in this group are of excellent quality. They are widely grown in home gardens and in small commercial orchards near market centers, but do not enter extensively into commerce.

The third group varies from the second mainly in size and shape. These are the Egg plums, very large, generally long-oval in shape, sometimes with a neck at the stem end. They vary from yellow to purple in color.

One other species which came by way of Europe, *P. cerasifera*, is also grown in this country. These are the small, nearly round, to oval Damson type, named for the city of Damascus and greatly prized for jam and plum butter.

The *domestica* plums are commonly called European, but it is quite certain that the original home of the species is not Europe but rather western Asia. A number of botanists have reported the species as apparently native in the area south of the Caucasus Mountains to the Caspian Sea.

Romans Had "a Vast Number"

Plums do not thrive in tropical or subtropical climates. The Egyptians left no record of them. The first Roman writer to mention them was Pliny. In the first century he described several kinds briefly and referred to "a vast number of varieties."

The major areas of plum growing in Europe developed north of the Mediterranean countries, and apparently the growing of *domestica* type plums in those countries is rather recent. According to European historians, prunes were introduced into Hungary from Turkistan late in the 15th century. All the Balkan countries are now important prune producers.

The Reine Claude group takes its name from Queen Claudia of France, whose husband, Francis I, ruled at the time of their introduction into that country, about 1500. A little later they were introduced into England by Sir William Gage, whence came the name Greengage. Thus it may be presumed that these plums were not widely grown in Europe before the settlement of America.

There is only meager data as to their introduction into America. The French brought them to the Maritime Provinces of Canada, and undoubtedly the English brought them to their colonies. *Domestica* plums did not assume an important place in American horticulture, however, until after the Revolution, and did not reach the proportion of a major crop until the settlement of the Pacific States.

These plums and prunes require an equable climate for best development. They bloom early in the spring, and in many locations are subject to frost damage and loss of crop. The fruit cracks badly and is subject to decay under heavy rainfall conditions. Thus in the eastern United States only the most favored fruit sections such as the lake area of western New York, can achieve much success with them.

In the valleys of the Pacific States the *domestica* plums are ideally adapted and reach maximum production. There all the prunes for drying are produced, and large quantities are commercially canned or shipped fresh.

Damsons Got to Europe First

Damson plums apparently were native not only in western Asia but across most of Europe. Pits of this type of plum have been found in the lake dwellings of Switzerland. The recorded history of the Damson is older than that of other species. Greek poets of the 6th century B. C. mention them. The selected, improved varieties, however, appear to have come originally from western Asia.

The Damson types were introduced into the Colonies and, prior to the Revolution, appear to have been grown more widely and successfully than the *domestica*s. These tart, spicy plums are now widely disseminated in those parts of the United States having a moderate climate. They are produced mainly in home gardens and for local markets. Damson jam or plum butter is greatly esteemed by most of those who know it.

Southwestern American Plants Are Cultivated Throughout the United States

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American Plums—Fruit of the Pioneers

NATIVE American plums belong in this story of fruits, not because they are important in commerce, but because of the place they filled in the diets of pioneer settlers.

From New England to Florida, the early colonists found wild plums. As the wagon trains rolled westward, the settlers discovered them growing in all sections west to the Rockies. Beyond the Rockies, on to the Pacific, they occurred in scattered locations.

No other native tree fruit is so widely distributed in this country as the plum. Some form of it is found in every State in the Union. And, while our native plums are not generally of high dessert quality, most of them, as they grew wild, make very good jam, jelly, and plum butter. These offered a welcome and valuable variety to the simple and often monotonous diet of the pioneers.

Even today large quantities of native plums are gathered from the wild. Cultivated varieties derived from them are among the most dependable fruits for growing in some parts of our country, particularly in the colder sections.

The colonists who settled in New England found two principal kinds of plums. The Canadian plum, *Prunus nigra*, grows throughout New England and New York, about all the Great Lakes, over much of Minnesota, and into Canada. The flowers are large for a plum and have a pink tinge, an unusual characteristic since plum flowers are generally pure white or green tinged. The fruit is oval to oblong, a little over an inch long, and varies from crimson to orange-yellow in color. It ripens in late August and September.

The Indians gathered and dried these fruits in large quantities. This species is very hardy, and a number of horticultural varieties from it are now widely grown in northern areas.

The second plum in New England grew only near the ocean, on sandy soils. This beach plum, *P. maritima*, is a small bush bearing nearly round fruit about two-thirds of an inch in diameter. It grows in a narrow belt from southern Maine to Virginia and is greatly prized today for jam making. It is most like the European damson of any native plum and has a special spicy flavor that many people enjoy.

The Red, Horse, Hog, or Goose Plum

A third great species, *P. americana*, is well named. It spreads over about half the area of the United States, from New York to Montana and south to Louisiana and Mississippi.

In most areas it is simply called wild plum, but it is also known as Red plum, Yellow plum, Horse plum, Hog plum, Goose plum, August plum, and, in the far south, Sloe. The fruit ripens mainly in July in the south, and in September in the north. While the plums vary somewhat in different areas, they are generally nearly round, reddish-orange to red, and one inch or less in diameter. This plum has contributed many varieties of value, especially in the western Plains States.

The Chickasaw plum, *P. angustifolia*, is native in the southern States from Maryland to the Gulf and west to Kansas and Texas. The fruit is oval to spherical, usually bright red, but sometimes yellow. It does not survive in the north. The sand plum of the western Plains, closely related to the Chickasaw, is one of the most valued fruits in Kansas and Nebraska.

Two species of plums native in the lower Mississippi Valley are valuable both as native fruits and as sources of cultivated varieties. Both are found from Tennessee and Kentucky west to Kansas and Oklahoma. *P. horrulana* is late ripening, its fruit nearly round, about one inch in diameter, color, red to yellow. The wild Goose plum, *P. munsoniana*, is early ripening, fruit round to oval, bright red. Both are late blooming, so the blossoms are likely to escape spring frosts.

One other species deserves mention, not because it is widely distributed, but because the quality of the fruit closely approaches that of the European plums. *P. subcordata*, the Pacific or Western plum, is found in the foothills from central California to central Oregon. The fruit is late ripening, globular, red to purple, about one inch in diameter, and is extensively used for preserves.

Improving the American Plum

While the colonists who settled along the eastern seaboard gathered plums from the wild to some extent, there was little effort to improve them during colonial times. Perhaps this was because good quality European varieties could be produced in the central and northern colonies at least. Not until settlers crossed the Mississippi were native plums of special merit selected, named, and planted in some orchards.

During the last half of the 19th century, literally hundreds of such selections were made and named. Many of these represented little improvement and soon passed out of use. Breeders, both private and in State experiment stations, have continued efforts to improve these plums, and a number of varieties are now available that are of great value where European varieties do not thrive. Particularly in the Plains States, the North Central States, and in the South, these varieties are more satisfactory for home and local market growing than are any other plums now available.

Birds Spread Cherry Seeds Across Asia Minor, the Balkans and Western Europe

"Loveliest of Trees, the Cherry . . ."

IN AN average year Americans consume fresh or in pies, candies, preserves, beverages, and assorted drugstore delicacies about 200,000 tons of cherries. Round, plump, and abundant—a single tree has been known to yield 2,000 pounds of fruit in one year—cherries have for centuries been looked on as the symbol of ripeness and sweetness.

Species of cherries are plentiful throughout the northern Temperate Zone—from Japan, throughout Asia and Europe, to our own Pacific Coast. Asiatic species have contributed the famous flowering cherries of Japan, now flourishing and famous in our own Capital and gaining popularity as ornamentals in many American gardens and parks.

The fruit of a few American species is gathered and used to a limited extent, particularly the chokecherries and sand cherries in the Plains and Rocky Mountain States. The two species that have furnished our cherries of commerce, however, both appear to have originated in the area of Asia and Europe centering about the Dardanelles and extending from the Caspian Sea in Asia westward through the Balkan countries of Europe.

Cherry Pits Found in Stone Age Caves

The sweet cherries, *Prunus avium*, had spread throughout temperate Europe before the beginning of civilization there. Commonly known as bird cherries, this species, a favorite food of birds, had reached Britain and western continental Europe before the history of those countries was recorded. Pits of sweet cherries found in the remains of cave habitations of central Europe indicate that these fruits were gathered and used there as early as the Stone Age.

The sour, or pie cherry, *P. cerasus*, seems to have spread more slowly, and perhaps mainly through human agencies.

Apparently the earliest reference to cherries [illegible] by Theophrastus, the Greek "Father of [illegible]" who described the trees and fruit about 300 B. C.

Pliny, in Italy in the first century, described 10 kinds of cherries. These appear to have been types, rather than varieties as we regard them today. He also referred to the cherry as having been taken to Britain. Another Roman, Marcus Terentius Varro, in his book on farming written about 50 B. C., discussed grafting of cherries, and by implication indicated that neither cherry culture nor grafting were new when he wrote.

Thus cherry culture was apparently under way in a number of European countries by the beginning of the Christian Era. Little further progress seems to have occurred until the emergence of Europe from the Dark Ages in the 15th and 16th centuries. Not until the latter century did variety names appear.

Cherries from Europe were introduced into America as soon as the English, French, and Dutch settlements were made. If cherries were planted by the Spaniards in the West Indies and Florida, they did not thrive. But in the cooler climates, from Newfoundland to Virginia, they were growing shortly after the first settlements. Reference is made to the cultivation of the Red Kentish cherry in Massachusetts in 1629, only nine years after the Pilgrims landed.

By the middle of that century, cherries, in common with other Temperate Zone fruits of Europe, were widely distributed in the Colonies. According to tradition, if not fact, one early American farmer, Augustine Washington, valued his cherry trees only slightly less than the veracity of his son George.

Cherries advanced westward with the settlement of the country. They were first taken to California by the Spanish missionaries when that State was a part of Mexico. Cherries were a part of the covered wagon load of tender fruit varieties that pioneer horticulturist Henderson Luelling took to Oregon in 1847. This resulted in the start of the great sweet-cherry industry in the western States.

The cherry thrives best in moderate, rather cool climates. The sour cherry is more tolerant of both summer rainfall and winter cold than is the sweet. The latter cracks and rots when rains occur near ripening time. As a result of this, the principal centers of sweet-cherry production are in the States west of the Rockies where summers are dry and winters are generally moderate.

Sour cherries are produced throughout the northern half of the United States, except in the coldest areas of the Plains States. Greatest production is around the Great Lakes, with Michigan, New York, and Wisconsin leading.

Neither the sweet nor the sour varieties are adapted to the hot, often humid conditions in the southern half of the country.

First Bing Cherries Were American

Our important sour cherry varieties all represent direct importations from Europe; our important varieties have been developed in this country. On the other hand, several of our sweet varieties, including the large nearly black Bing and Lambert, which are the most important fresh market kinds, originated here as chance seedlings.

Sour cherries are mainly marketed canned or frozen. The major use is in pies and preserves. Sweet cherries are popular in midsummer on fresh-fruit markets, the richly flavored fruits being highly esteemed. They are also canned commercially, and are the principal source of maraschino cherries.

Most Grow More Bags of Grapes than Any Other Fruit. Most Are Used for Wine

Fruit of the Vine

ONE [illegible] world grape production is to start with California. On a little over half a million acres, Californians grow a little less than 3,000,000 tons of grapes a year. These provide more than nine-tenths of all the wine, raisin, and table grapes sold in this country. A single vineyard, in Cucamonga Valley, covers 5,000 acres.

Yet California produces less than ten percent of the world's grape supply and only about three to four percent of its wine. World-wide, grape growing is the biggest of all fruit industries.

Used mostly for wine, grapes are produced in tremendous quantities in all the Mediterranean countries of Europe, and in all other countries having moderately dry summers and equable temperatures. Both grape culture and the art of wine making were known to men before the beginning of recorded history.

The Old World grape, *Vitis vinifera*, has been cultivated so long that its place of origin cannot be determined with accuracy. Seeds of grapes found in Swiss lake dwellings date to the Bronze Age in Europe. Grape seeds have been found in the oldest tombs of Egypt, and there is evidence that the Egyptians grew grapes and made wine 6,000 years ago. The oldest Hebrew, Greek, and Roman writings all refer to grapes and wine making.

The best evidence indicates that the *vinifera* grape originally centered in the area about the Caspian and Black Seas, the great cradle of deciduous fruits. It was spread both by natural means, with birds and mammals carrying the seed, and by the hand of prehistoric man.

North America Was a Land of Vines

The first European visitors to North America, the Norse voyagers, found native grapes so abundant that they called the country Vinland. The first English settlers in Virginia found great vines clinging over the trees, especially along the streams.

In quality, however, the wild American grapes were far from the choice European kinds, improved through thousands of years of selection. Why not transplant the Old World varieties?

Steps were quickly taken to import super or European vines. Almost every colony had laws to encourage grape growing. Literally hundreds of vineyards were set, and skilled French vine growers were brought over. There even were penalties for settlers who failed to plant grapes, and rewards were offered for success in vine growing and wine making.

Yet despite great effort, no one attained success with the Old World grape. In the 'vineyard paradise' of the Colonies there were fungus diseases and insect pests that attacked and destroyed the plantings of Old World grapes. To this day, and even with modern insecticides and fungicides, the Old World grape is not successfully grown in the humid climate of eastern North America.

While the eastern colonists were struggling to establish *vinifera* grapes in eastern America—and failing—the picture was far different in the West. The Spaniards established a colony in New Mexico in 1598 and founded missions in California beginning in 1769. There the Old World grape flourished in the dry growing season and mild winters.

Production of the Old World grape in the United States is today largely limited to the southwestern States. Varieties grown have largely been imported directly from Europe. The largest portion of these grapes is dried for raisins, though large quantities are made into wine, and thousands of carloads are shipped to all parts of the country for use fresh.

Our "Natives" Still Thrive in the East

In all other sections of the United States, varieties derived in part or entirely from native species are grown. In the South the Muscadine varieties, derived from the species *V. rotundifolia*, are best adapted. They are highly disease-resistant, have a tough skin and are borne in very small clusters. In more northern areas varieties derived from *V. labrusca*, such as Concord and Niagara, are mainly grown.

The American grapes are hardier to winter cold than the Old World grape. They are generally considered less suitable for wine making, though excellent wine can be made from many varieties. They are the only kinds used for making grape juice, and are superior to the *vinifera* grape for jellies and jams. They have a less meaty pulp than most Old World varieties, so are less suitable for raisins.

An insect pest that attacks the roots of grapes, the root louse phylloxera, was native in eastern America and was accidentally taken to Europe at least a century ago. For a time it threatened the existence of grape growing in many European regions. American species, however, are resistant to this sucking insect.

Now most European vineyards are grown on roots partly or wholly of American stock. These stocks are also used for Old World varieties in California and in many other grape-growing regions of the world. Thus today the grapes of the East and the grapes of the West are truly joined in practically all grape production of the world. American varieties have also spread to other world areas where, because of winter cold or humidity, the *vinifera* grape is poorly adapted.

Figs Cultivated Since Antiquity, Grew First in Mediterranean Lands

In parts of Europe figs are known as the [illegible] and choicest varieties would be [illegible]

To Ancient Man, Figs Were a Sacred Fruit

IN AMERICA figs are generally eaten as a luxury, a sweet dessert, or a mixed in a fancily wrapped box of gift fruit. In some Mediterranean countries, however, they are a basic part of the diet.

Their importance in these areas is shown by legends that grew up about them in ancient times. The Romans considered the fig *Ficus carica*, a gift of the god Bacchus. In the countries of southwestern Asia, in Egypt, Greece, and Rome, figs were regarded as sacred. Their significance in Hebrew life is indicated repeatedly in the Bible, beginning with the story of the Garden of Eden. A well-known fig tree, showing the harvesting of the fruit, is on the wall of a 12th dynasty Egyptian grave (about 1888-1778 B. C.).

The species from which the cultivated fig has come apparently had a wide range in the area near the Mediterranean from Syria westward to the Canary Islands. A fruit so long cultivated may have become naturalized in parts of the area. But seed remains found in France and Italy indicate that house plants grew there long before the Stone Age.

Aristotle Studied Fig Pollination

Figs were probably first cultivated in Asia and Egypt, and doubtless the sweeter, better kinds were selected and propagated with the beginning of agriculture in those ancient countries. They were known and prized in Crete in 1500 B. C. and in Greece a little later. The Greeks even knew in part the need for experimentation, a process whereby some of the fruit bearing trees must be pollinated. Aristotle, in the 4th century B. C., recorded that people had to visit the young fruits or they would drop. He could not, however, fully understand why.

Introduction of figs into America can be traced to the Spaniards. Varieties from Spain were sent to Hispaniola in 1520, and were reported to be bearing well in 1526. Before the end of the 16th century, figs were reported as abundant in Peru, and were established in Florida at St. Augustine. Capt. John Smith reported in 1629 that on "Mistress Pearce's" of the Jamestown, Virginia, settlement, "there a hundred bushels of excellent figges."

In California the fig, like many other fruits, dates from the establishment of the missions at San Diego in 1769. The variety now called Mission, which was planted there, is still the leading black fig grown in the State. Although figs were widely planted in gardens in California earlier, commercial culture did not start until about 1885.

Many varieties of figs will set fruit without pollination, and these can be grown successfully without caprification. The choicest of the white drying varieties, however, belong to a group known as the Smyrna type, and these must be pollinated.

Many trees of this type were planted in California late in the last century and grew well, but the fruit dropped before maturing. Capriflgs, the trees used for pollinating this type in Europe and Asia, had been brought into the State. But the insect that carries the pollen into the fruit, a small wasp called the *Blastophaga*, was not present, and early efforts to introduce it were not successful.

There was wide difference of opinion as to the necessity for the insect. Finally it was successfully established in the State through an importation in 1899 by the United States Department of Agriculture of capriflgs fruit containing the *Blastophaga* wasps.

This insect breeds in capriflgs, which are grown in special tracks away from the fruit-bearing fig trees. At the proper time, the caprifigs are gathered with the wasps in them and hung in small bags in the fruit bearing trees.

The female wasps crawl out, becoming covered with pollen as they do so. They crawl into the fruit of the Smyrna varieties seeking a place to lay eggs and in the search pollinate the flowers. Since the introduction of the insect and the working out of suitable handling techniques, production of these Smyrna varieties in California has been successful.

The fig is a semitropical tree which sheds its leaves in the winter. When fully dormant the trees will stand temperatures down to about 10° F. without serious injury. Temperatures below 5° will kill them to the ground, but in most cases, when this happens new shoots will sprout up from the roots.

California Grows Most of Our Figs

Most commercial fig growing in the United States is in California. About 35,000 acres there are devoted to figs, with an annual crop of some 52,000 tons of dried figs, 19,000 tons of fresh, and more than 3,000,000 cases of canned fruit. Figs are also grown commercially in Texas and as a home-garden fruit in other parts of the South.

Most of the world's commercial fig production is marketed in the dried form, some of it is canned or preserved. Figs are esteemed in the fresh form in countries where they are grown, but are difficult to ship and handle for distant markets.

Italy is now the leading country of the world in fig production, most of the fig orchards being south of Naples and in Sicily. Turkey ranks second. Spain, the United States, Algeria, Greece, and Portugal all have major industries. Many other countries with suitable climatic conditions produce figs on a smaller scale.

Olives, Oil-bearing Fruit from Southern Europe

IN CROWDED countries, or those where conditions are not suitable for extensive meat production, men turn to plants for the oil they must eat to live. In lands bordering the Mediterranean Sea, the olive tree supplies much of this need. From 20 to 60 percent of a ripe olive is oil. Men extract almost a million tons of oil a year from olives.

In Spain, which leads the world in olive-oil production, 6 percent of agricultural production is in olives. In Greece the proportion runs as high as 18 percent. Italy ranks olives second only to grapes in importance; in Portugal they are the leading tree crop—and the Portuguese consume nine-tenths of all the oil they produce.

A Good Omen to Men Ever Since Noah

The olive is another of the fruits that may be traced to the beginning of recorded history, and beyond. The earliest Hebrew books mention the olive under the name *zait* or *zeit*. The story of the dove from Noah's Ark returning with an olive leaf, as told in the Book of Genesis, is familiar to all. The olive was a very important and valuable source of oil to the early Hebrews, and was also cultivated by the ancient Egyptians.

Today the wild olive, *Olea europaea*, is found from western India westward through southwest Asia and all about the Mediterranean borders. It is not certain that it is truly native throughout that range. In some districts, especially along the edges of the present range, the trees may be escapes from cultivation. Language research indicates that the true center of the olive species was probably the area from Syria to Greece.

Certain it is that the olive was known and cultivated for its oil from the beginning of agriculture in Syria, in Palestine, in Egypt, in Greece, and, a little later, in Rome. The ancients used the oil for food, for medicine, and for anointing their bodies. In Rome a favorite saying was that a long and pleasant life depended on two things, "wine within and oil without." Olive oil was also burned in lamps for lighting.

The olive requires a long growing season to mature its fruit, and is not tolerant of low temperatures. The tree is injured when temperatures down to 15° to 10° F. occur. Thus its range in Europe is limited to countries around the Mediterranean.

The Spaniards apparently introduced the olive into America. While it did not thrive in the humid climate and acid soil of the West Indies and Florida, it prospered in the drier air of Mexico. It was introduced into California with the establishment of the first missions. Since then, other valuable varieties have been brought in from Europe.

Today California and, to a limited extent in Arizona, the commercial olive culture developed in the United States. The industry here is primarily based on olives for pickling; oil is extracted from the fruit which fails to grow large enough for that purpose.

The olive fruit is green in color when immature, turning to black as it ripens. For green olive pickles, the fruit is picked immature; for black olive pickles, it is allowed to become mature on the tree, but not soft ripe. When harvested for oil, the fruit is allowed to ripen fully.

The olive fruit fresh from the tree, both green and ripe, is intensely bitter. In the pickling process the fruit both for green and ripe pickles is first soaked in lye solution to destroy the bitter taste. After thorough washing to remove the lye, the ripe olives are soaked in strong salt solution. They can be held for a long period in brine, but should then be soaked in fresh water overnight to remove the excess salt.

After salting, they are canned commercially under steam pressures which hold them at a temperature of at least 240° F. for 90 minutes. In the preparation of green olives there are variations in the process to bring about the development of special flavors.

Methods used to extract oil from olives vary greatly from one country to another, and depend in part on what the oil is to be used for.

In some cases fruit is first crushed beneath rollers, then squeezed in presses—which may be simply flat boards with stones on top, or, in modern plants, costly hydraulic machinery.

Since the oil is contained in the pulp of the fruit, stones are sometimes removed before pressing. In all cases where the oil is to be eaten, speed is essential between harvesting and pressing; oil left in bruised olives soon grows rancid.

We Import as Much as We Grow

There are large areas in the southwestern States of this country where olives can be grown successfully. Because of the great amount of hand labor, particularly in harvesting fruit, the growing of olives for oil has not developed on a large scale here. Total production of olives in this country, almost entirely in California, averages about 50,000 tons of fruit per year, of which about half is used for pickling and half crushed for oil.

American imports of olive oil amount to approximately 15,000 tons per year. In addition, about 10,000,000 gallons of green olive pickles are also brought in annually from south European countries, mainly Italy and Spain.

In Mediterranean Countries the Olive Tree Provides the Fat of the Land

Dates Provide Food in Barren Deserts

SAID MOHAMMED: "There is among the trees one that is preeminently blessed as is the Moslem among men; it is the palm."

Small wonder that desert dwellers of Arabia, Egypt, and westward to Algeria and Morocco call the date palm blessed. The fruit, containing more than half its weight in sugar and smaller quantities of fat and protein, is one of the most important food sources in a generally barren land. It furnishes shade for men and animals. The leaves are used for making baskets, matting, and huts, the fiber for rope. The roasted stones, or pits, are a substitute for coffee.

When the palm becomes old and nonproductive, or before, it is tapped to draw off the sap, from which a toddy is made, called in ancient cuneiform inscription "the drink of life." Finally, the trunks are used as fuel.

The exact origin of the date palm, *Phoenix dactylifera*, is unknown. Certainly it is one of the oldest food plants known to mankind. Long before history begins, it grew in Arabia, Babylonia, and Egypt, as indicated by plant remains as well as by tradition and the oldest writings.

Moisture Feeds Roots but Molds Fruits

Although the date palm will grow throughout great areas of the world, wherever temperatures do not go lower than 5° to 10° F., the areas where fruit production is successful are much more limited. Even a small amount of rain and humid weather as the fruit approaches maturity will cause it to mold and sour. Thus fruit production is largely limited to areas having very dry summer and fall seasons. Although grown in naturally desert countries, the date palms require abundant soil moisture. Thus they thrive only about springs or oases, or where they can be irrigated.

Present Old World centers of date growing are the same countries that grew them in earliest times, Iran, Iraq, Arabia, Egypt, Libya, and Algeria. A few are grown in Spain, but in general date culture is meager in countries north of the Mediterranean. Too much rainfall and humidity are the chief limiting factors.

No one knows exactly when date palms were first planted in the United States. Spanish missionaries planted seeds around the missions in the Southwest before 1800, at the latest.

The real beginning of date culture in the United States came in 1890. In that year, the U. S. Department of Agriculture arranged for palms of some of the better varieties from Egypt to be planted in tubs and shipped to this country. Later, plantings from the Department visited all important date-growing countries, secured offshoots of the better varieties, and successfully established them. Commercial firms followed with larger importations of the better kinds.

The only way of propagating superior date varieties is by these offshoots, or "suckers," which develop from the base of relatively young palms. The suckers, much like those that form near the base of corn plants, may be cut off when 3 to 5 years old. Carefully handled, especially as to watering, each will grow into a new palm. Since each palm produces only a relatively few offshoots, mainly in its early years, the multiplication of superior dates is a slow process.

Only a few areas in this country [illegible] to date-fruit culture [illegible] in the interior desert valleys of southern California and Arizona, which have intensely hot, dry summers and autumns, much like Arabia and North Africa.

The greatest concentration of planting is in the Coachella Valley in California, northwest of the Salton Sea. There are now some 5,000 acres of date palms in this country, with production averaging around 20,000,000 pounds a year. Even so, considerable quantities are still imported from southwest Asia chiefly Iran.

Date varieties are of three kinds, soft, semidry, and dry. The soft dates are richly flavored, but are difficult to ship and handle. They are used extensively in various date confections. The semidry dates are those principally found in the markets of this country. The dry dates, little grown or sold in the United States, are relatively hard-meated, sweet, and nonperishable, and are a very important food in Arab countries.

In our southwestern desert date centers production practices have been studied more scientifically than any other place in the world, and Old World countries now look to us for technical information on date culture. The U. S. Department of Agriculture has maintained a research station for date investigations at Indio, California, almost from the start of date culture here.

Flying Fans Make Artificial Breezes

Such research has turned date growing in the United States into a complex science based on a mixture of tedious hand work and mechanization. Heavy paper wrappings are sometimes tied over individual bunches—which may contain 1,000 or more fruit—to guard against insects, birds, or dampness. Pollination may be done by tying male flower strands into female flower clusters with rubber bands, or with a pollen duster. On occasion, helicopters have been hired to fly low over date treetops and fan away moisture.

[illegible]

Gold Flows from Orange Groves

THE orange industry in the past half-century, has undergone one of the most astounding booms in the history of agriculture. In 1900 oranges were a luxury in most of the United States, a Christmas treat or a dessert for special occasions.

Today oranges are for sale in every crossroads store the year round. Orange juice is a regular part of the breakfast of most children and many adults. In tons produced, in dollar volume, and in popular taste, oranges are our leading fruit.

Most recent increase has come in the production of frozen, concentrated juice. From almost nothing before World War II, frozen orange juice has grown into a $100,000,000-a year business using about one-fourth of our total crop of some 4,000,000 tons a year.

Oranges, Too, Got Their Start in Asia

The native home of the orange is south China and Indochina. From there it has spread to every part of the world which has a suitable climate. The orange tree will withstand only a few degrees of frost. Temperatures of 25° F. will cause some injury to the trees, and temperatures below 20° will cause severe injury or death.

The oranges of the world are classed in three principal kinds, each with many varieties. The most important, both in the United States and in most other countries, is the sweet orange, *Citrus sinensis*. These oranges are relatively sweet, generally round to oval in shape, and the peel adheres rather tightly to the pulp, or flesh.

The mandarin oranges, *C. reticulata*, have thin, loose skin that separates very readily from the pulp. The segments of the pulp also separate easily. These can be further classed as the tangerines, having dark, orange-red peel, and the satsumas having lighter, yellow peel. The mandarin oranges are the kinds most extensively grown in China and Japan.

The third group, the sour or bitter oranges, *C. aurantium*, has fruits too sour and bitter for eating out of hand. They are used for making marmalade and for ade drinks in some countries.

Sweet and mandarin oranges have undoubtedly been eaten in south China since the country was inhabited. References to oranges in Chinese writing date back to about 2200 B. C. Their spread to other countries, however, was relatively slow. The sweet orange is not mentioned in European writing until after the beginning of the 15th century.

As with the lemon, once 1501, Columbus carried seed of the sweet orange when he sailed in 1493 to establish a settlement on Hispaniola. The orange flourished there early in the 16th century. It was taken to Mexico and Central America.

It was planted in Florida when St. Augustine was settled in 1565. It may have reached Florida even earlier, but there is no definite record of this effect.

Two centuries later, settlers found many wild orange groves, spread by seed from early plantings, in central Florida. These were growing about the lakes and, particularly, where there had been Indian villages. One such wild grove, described in 1704, was 40 miles long. Not until Florida became a part of the United States in 1821, however, did a commercial industry start.

The sweet orange reached California with the establishment of the mission at San Diego in 1769, and was carried to other missions as they were established. A planting of some 400 trees at the Mission of San Gabriel about 1804 represented the first sizable citrus orchard in the State.

The mandarin oranges, outranking the sweet oranges in popularity in China and Japan, did not reach Europe until 1805. By 1850 they were well known in Mediterranean countries. The first recorded introduction into the United States was by the Italian consul at New Orleans, who planted Chinese mandarins there between 1840 and 1850.

Research workers of the United States Department of Agriculture have crossed sweet oranges and tangerine oranges, the crosses being known as tangors. Such crosses also have occurred naturally and are among the most delicious of our citrus fruits.

Florida Raises Most Oranges

Today, Florida leads the world in orange production. California is a close second, followed by Texas, Arizona, Louisiana, and Mississippi.

In Florida and California, orange production is highly organized and strongly competitive. Both States have laws regulating the maturity, quality, and even the sweetness of oranges sold. To prevent diseases and molds which result from damaged skins, the fruit is picked by skilled workers, often wearing soft cloth gloves. Long conveyor belts may then carry the ripe oranges through successive washings in soap and water, borax solution, and clean water. Mechanical brushes scrub them as they go through the bath; then they are dried in wind tunnels. Some are even coated with wax for additional protection. Grading the fruit, wrapping them in tissue paper, and packing are done by hand.

Spain, Brazil, China, Japan, Italy, and Palestine are heavy orange producers; in fact, all tropical and subtropical countries produce considerable quantities.

Oranges, Grown in Florida and Texas, Are the World's Leading Fresh Fruit

[illegible] in Europe for the 5th century [illegible]

The Aristocrat of the Breakfast Table

AMERICA has given grapefruit to the world, although the grapefruit, like most of us living in America, traces its ancestry to other lands.

In tracing the grapefruit, we must consider first the pummelo, or shaddock, *Citrus grandis*. The native home of the pummelo is not definitely known. The general abundance of trees indicates that it probably originated in the Malay Archipelago and neighboring islands as far east as the Fijis.

The pummelo fruit is very large, often up to 8 inches in diameter. It has the color and general appearance of a very large, coarse, thick-skinned grapefruit. The membranes that enclose the segments are extremely tough. The tree is large for citrus, and a vigorous grower.

The pummelo apparently reached Europe about the same time as did the lemon (by, or before, the middle of the 12th century). Known under the name "Adam's apple," it was grown mainly as a garden curiosity.

There is no record that the Spanish took the pummelo to the New World. It was first recorded as being in the West Indies in 1696 by Hans Sloane, in a catalogue of plants of Jamaica. Its introduction there is credited to a Captain Shaddock, commander of an East Indian ship, who stopped at Barbados on his way to England and left seed of the pummelo there. Captain Shaddock not only introduced the fruit to the Americas but gave this ancestor of the grapefruit its generally known English name.

First Known as "Forbidden Fruit"

The grapefruit, so far as is known, originated in the West Indies, but the exact place or manner of its origin is unknown. It was first described in 1750 by Griffith Hughes, in his [illegible] *Barbados*, under the name "Forbidden fruit." A little later the forbidden fruit, or "smaller shaddock," was said to be "cultivated in most parts of the country (Barbados)."

The name grapefruit originated in Jamaica, apparently either from a belief that the fruit resembled the grape in flavor, or from the fact that the fruit is frequently borne in clusters.

The characteristics of the grapefruit suggest that it might have come from a cross of the shaddock and the sweet orange. Its behavior in breeding or when grown from seed indicates however, that it is not a hybrid. Its seed progeny is typically grapefruit, instead of showing the characteristics of two parents. It seems most probable that the grapefruit originated as a mutation of the pummelo, or shaddock.

Although grapefruit was described from Barbados in 1750, almost 100 years passed before it was introduced into Florida. Don Philippe, a Spanish nobleman, planted trees at Safety Harbor, Florida, presumably from seed from the West Indies. The exact date of this planting is not known, but it is believed to have been about 1810. From these Philippe trees and their seed progeny most of our grapefruit varieties have come.

The grapefruit's rise in popularity—after a comparatively slow start—has been meteoric. For several decades after it was brought to Florida the grapefruit was hardly known outside the State. There were no shipments to northern markets until after 1880. At the turn of the century only a few thousand boxes a year were being produced, individual grapefruit were still something to be stared at in fruit shops and talked about when served at the table.

Yet in 10 short years, by 1910, production had reached 1,000,000 boxes a year. It has grown steadily since, until today America produces some 50,000,000 boxes a year (about 80 pounds to a box).

Today's cultivated grapefruit trees are highly productive. They grow from 15 to 25 feet high, and have dark green leaves; a single tree, when mature, may produce up to 1,500 pounds of fruit a year.

End of the Seedy Core

The grapefruit of the early years was seedy, but a tree producing nearly seedless fruit was discovered near Lakeland, Florida, and propagated about 1890. This tree was the start of the nearly seedless variety, Marsh, which is now the most widely grown kind. Still later, mutations having pink color in the flesh were found, some of them seedless, or nearly so. Today the pink-fleshed, seedless varieties command a premium on the fresh-fruit markets.

The State of Florida, cradle of grapefruit culture, still leads in the growing of this crop. Since 1925 there has been a great development in grapefruit growing in the Rio Grande Valley in the extreme southern tip of Texas. Arizona and California also produce substantial quantities.

When the fruit became so popular in this country, other citrus-producing areas also became interested in it, and today grapefruit is grown to some extent in all citrus-growing countries. Nowhere else, however, has it become as popular as in the United States.

Grapefruit have been crossed with a number of other kinds of citrus. Crosses with tangerine oranges have produced a new class of fruits called tangelos. These are usually fiber, rather thin-skinned fruits which peel easily and have a rich flavor.

Grapefruit Evolved from the Shaddock, a Thick-skinned Low Indian Fruit

[illegible]

The Ade Fruits, Lemon and Lime

LEMONS and limes probably have more varied uses than any other citrus fruit. In many parts of the world, one or the other is used to flavor fish, meat, pies, puddings, and other foods. In the United States lemon juice is a popular ingredient in salad dressing, and also goes into much of the tea drunk. Both form the basis of ade drinks, popular in hot weather.

Their richness in vitamin C makes both valuable additions to the diet. Sales of lemons in this country are noticeably linked to the prevalence of colds as well as to hot weather. British sailors were first called "limeys" because of the quantities of limes carried them on shipboard to prevent scurvy, a disease caused by lack of vitamin C.

Yet, despite their value and versatility, both fruits are limited to a comparatively small share of the citrus market. The reason is obvious: in a beverage glass one small lemon or lime does the work of two or three good-sized oranges.

The Orient Grows a Sweeter Lemon

The lemon, *Citrus limon*, and the Lime, *Citrus aurantifolia*, are closely linked botanically and historically. Both occur as sweet fruits, as well as the highly acid fruits we know. The sweet varieties are highly prized in Oriental countries.

Their native home is believed by most authorities to be the warm humid district to the east of the Himalayas, in northern Burma, and possibly in eastern India. Both of these fruits, however, have tended to naturalize in any country in which they are well adapted, so the exact original home cannot be determined.

The Arabs established the lemon, and apparently the lime also, in Persia and Palestine, and both undoubtedly were growing in those countries at the time of the Crusades. European writers mention lemons and limes only after that time, and there is strong evidence that the returning Crusaders carried these fruits, as well as sour oranges, to Europe. By the middle of the 13th century they were recorded as well known in Italy.

The date of the introduction of citrus fruits, including lemons and limes, into the Western Hemisphere is well established. On his second voyage to the New World, to establish a colony, Columbus took seeds of many plants. It is recorded that he stopped at the island of Gomera, one of the Canary group, from October 9 to October 13, 1493 and while there secured seeds of oranges, lemons, and many vegetables.

He landed on the island of Hispaniola and established his settlement at Isabela, not far from the present town of Monte Cristi. Apparently the citrus that he planted prospered, for some 30 years later the abundance of citrus trees on the island was described as beyond counting.

The Spanish conquerors carried citrus fruits to the mainland of Mexico and Central America in the early years of the 16th century. The Portuguese had established them in Brazil by 1540. They were planted at St. Augustine, Florida, when the Spanish settled there in 1565. Soon groves of seedling citrus, spread by the Spanish and Indians, were present in various parts of Florida.

It was two centuries later that the Franciscan padres established at San Diego the first mission in what is now California. They moved there from Mexico and presumably took with them the fruits they had been cultivating, among them, lemons and limes.

Under commercial culture the lemon is subject to serious diseases in hot, humid climates. An early lemon-growing industry in Florida was wiped out by a great freeze in 1894-95. It was never re-established, partly because of the disease problem which had harassed growers even before the freeze.

Today two great centers of lemon production have grown up, both with equally warm climates. One of these is southern Italy and Sicily. The other is in southern California, mainly in the counties near the coast, where the Pacific tempers both the winter cold and the summer heat.

Curing Improves the Flavor

Though lemons were introduced in California more than a century earlier, commercial production did not expand much until about 1880. For years California lemons were regarded as inferior to the Italian. This has been blamed on the fact that growers there did not "cure" the fruit before shipping, a practice commonly followed in Italy.

The curing process consists in picking the fruit while still green and allowing it to ripen in cool storage before packing for shipment. After adopting this practice, the California lemon industry grew rapidly, the State now supplies more than half the world's lemons.

The lime thrives better than the lemon in hot, humid climates, being more resistant to fungus diseases. Thus in humid, tropical countries, the lime, instead of the lemon, is the predominant acid, or ade, fruit. Limes are grown extensively in Mexico and the West Indian Islands. Production in the United States is mainly in southern Florida, although some are produced in California. Egypt leads the nations of the world in lime production, both sweet and sour kinds being grown there.

Photo by [illegible]

Columbus Planted the First Lemons and Limes in the New World in 1493

[illegible] probably originated in Burma and spread west. Columbus brought them to Europe from [illegible] the United States.

Banana, Fruit of the Wise Men

BANANAS are the most important fruit in tropical lands around the world. Not only are they a major part of the diet for millions who live in the Tropics but they are also a leading export. About 90,000,000 bunches a year go into world trade, each bunch containing 10 to 20 "hands" of fruit and averaging about 50 pounds in weight.

There are many reasons for the banana's popularity. One is its high nutritive value. A banana contains as much as 22 percent carbohydrate, a rich source of food energy, it also contains vitamins A and C. All these hidden benefits, moreover, are contained in a meat which is soft, sweet, and pleasantly aromatic.

Also in the banana's favor are the ease and speed with which it grows. Banana "trees" are not really trees at all: they are huge herbaceous plants which quickly shoot up to a height of 15 to 30 feet. The plant's true stem is underground and has buds, or "eyes," like a potato. These underground stems, or rhizomes, are transplanted to establish new plantings; as with potatoes, each may be cut into several pieces.

Ready to Eat in 18 Months

Under favorable conditions, the leaf-bearing stalks appear above ground some three to four weeks after planting. They grow rapidly. The bloom appears about ten or twelve months after planting, and the fruit is mature five or six months later.

The botanical name of the common banana of commerce, *Musa sapientum*, means "fruit of the Wise Men." It traces to an ancient legend that the sages of India rested in the shade of the plant and ate of the fruit.

A second species, *M. nana*, the dwarf banana, is a smaller plant, but it bears fruit similar to that of the common banana. These two species, native in southern Asia, probably India, and in the Malay Archipelago, have contributed the varieties of bananas grown throughout the world today.

The closely related plantains, or cooking bananas, *M. paradisiaca* and *M. fehi*, are important food plants in the Tropics. These fruits are not palatable raw since they remain starchy when ripe, but they are excellent food when cooked.

All evidence shows that the banana is one of the oldest fruits known to mankind, perhaps one of the first plants to be cultivated. It had distinctive names in Sanskrit, in ancient Chinese, and in the Malay languages, indicating that it was known throughout much of southern Asia in prehistoric times.

Bananas were found on all the tropical Pacific islands when those islands were first visited by white men. Apparently the fruit was transported with the waves of migration eastward from the Asiatic mainland to these islands. The first such immigration is believed to have occurred at about the time of Christ.

The Arab poet Masudi, who died A. D. 956, extolled a dish popular in Damascus, Constantinople, and Cairo—a confection of almonds, honey, and bananas in nut oil. This indicates that bananas had reached the Mediterranean shores by that date.

Friar Tomas de Berlanga, a missionary [illegible] is usually credited with introducing the banana into the New World. He [illegible] Hispaniola in 1516. Shortly afterward, bananas were taken to the mainland of Mexico. The fruit thrived so well and spread so rapidly throughout the American Tropics that later visitors mistakenly thought the banana native on this continent.

Growth of a Giant Fruit Industry

Throughout the first half of the 19th century, vessels occasionally brought a few bunches of bananas from the West Indies into American ports. After the close of the Civil War this trade increased, but many shipments were overripe when they arrived. Between 1870 and 1880 American planters established commercial production in Central American countries, and, with steam vessels, delivery to northern markets became more dependable.

During the same decade, banana production in Jamaica became commercialized, with regular shipments to Boston. At this time large numbers of companies were engaged in growing, shipping, and distributing bananas in the United States. Conditions in growing and marketing were chaotic, and there was great variability both in the supply and in the condition of the fruit delivered. In 1899 the principal companies in the banana trade incorporated as the United Fruit Company.

The banana industry is now one of the most highly organized fruit industries of the world. Plantations are distributed throughout Central American countries, Colombia, and the West Indies, so that risk of crop failure is minimized.

Railroads have been built to carry the fruit from the plantations to shipside. Modern refrigerated steamers transport the fruit to American ports; there it is loaded into refrigerator cars for shipment to all parts of the Nation.

More than 60,000,000 bunches of bananas are sold annually in the United States, and this strictly tropical fruit is available in almost every food store in the country. Large quantities are also marketed in Europe. Thus the fruit of the Wise Men, the food staple of the Tropics, has become a world-wide article of commerce.

Bananas from India Are the Most Important Fruit of the Tropics

Most bananas are now grown in the Tropics of the New World, but the world's supply comes from the Old World.

Mango, an Evergreen from India

MANGOES, possibly more than any other fruit, have their critics and their enthusiasts. A true mango lover may develop an almost crusading spirit in promoting the fruit. In India, where mangoes are most widely grown and eaten, wealthy gardeners often collect varieties of mango trees; one such garden is reported to contain 500 varieties.

A leading American mango enthusiast [illegible] first famous as a plant explorer for the U. S. Department of Agriculture. In his Florida home, The Kampong, he has collected and cultivated many fine varieties. His recent book, *The World Grows Round My Door*, contains a chapter on "The Gorgeous East Indian Mango"; the following quotation from it gives an inkling of the feelings of a true mangophile.

"Every morning in mango time, as I walk along the path . . . I have to lower my head to avoid striking one of the beautiful Borsha mangoes swinging like a pendulum . . . I fondle it with my hands and watch the red blush growing larger and brighter every sunny day while its greenish yellow tip turns to gold, my mouth watering for a taste of it."

On the other hand, there are the mangophobes, people who, after tasting a single mango, have pronounced the fruit inedible. They complain of a strong, rank flavor or, most often, say that it "tastes like turpentine."

It All Depends on the Mango

Why the sharp difference of opinion? The basis for it lies in the fruit itself. A superior variety of mango, properly ripened, is all that [illegible] is—one of the world's finest fruits. An inferior mango, or an unripe one, is fibrous, tough, acid, and does have a flavor resembling turpentine.

Early shipments of such inferior fruit from Florida to northern United States markets helped to start the mango off on the wrong foot in this country. It is this false first impression which the mangophiles now feel duty bound to overcome.

The mango is still little known in the United States outside of Florida, though it is one of the important fruits of most tropical countries. Its culture in the United States is limited to the southern third of Florida and to the most favored locations there. Temperatures two or three degrees below freezing will kill or seriously injure the trees.

Mango fruits are favored foods of a number of the fruit fly insects not now in the United States—the Mediterranean fruit fly, the Oriental, and others. For this reason fresh fruits can be shipped into the United States only from Mexico and from there only after special [illegible]. Thus mangoes on American markets are mainly those from the limited acreage in south Florida.

The cultivated mango, *Mangifera indica*, like the citrus fruits, is native to southeast Asia, probably also to the near-by islands. It has been known and cultivated in India since the beginning of agriculture there, and has long been one of the most important fruits of that country.

A mango grove is said to have been presented to Buddha in order that he might use it as a place of repose. Akbar, an emperor who reigned in northern India in the 16th century, is said to have planted a mango orchard of 100,000 trees, or well over 1,000 acres, at a time when large orchards were unheard of in any other part of the world.

The mango was slow to be transported to other countries. The Portuguese probably carried it to East Africa, where mangoes are now common, and also first introduced it into America. They planted it at Bahia (Salvador), Brazil, about 1700. It reached the West Indies some 50 years after its introduction into Brazil, and was taken to Mexico from there early in the 19th century.

First Florida Planting Failed

Henry Perrine, a pioneer Florida horticulturist, took mangoes from Mexico to his place south of Miami in 1833. These trees apparently were lost after Perrine's death. A second introduction, about 1861 or 1862, was successful. These early plantings were seedling trees, however, and bore inferior fruit.

Early attempts to introduce choice Indian mangoes were unsuccessful, but in 1889 the U. S. Department of Agriculture brought in six varieties. Most of these trees were also lost, but at least one tree of the high-quality Mulgoba variety survived. When it began to bear, some nine years later, the superior quality, as compared to seedlings, attracted wide interest. Since then, many choice Oriental varieties have been established.

The mango is a large tree with dense, glossy, green foliage. It is most fruitful in areas having alternate wet and dry periods during the year. Choice varieties are fastidious in their requirements; not only are they very subject to low-temperature injury but the roots will not tolerate water-logged soil. Even under the favorable conditions in Florida, yield of fruit of the choice varieties has often been low.

Some commercial canning of mangoes is done in Mexico and other large producing countries. In quality, canned mangoes are comparable to canned peaches. Canned mango is rarely seen in our markets, though Indian chutney, made with mangoes, has had substantial sale here.

Mangoes, a Basic Fruit in the Tropics, Are Still Rare in America

[illegible] Southeast Asia and the Malay Archipelago. Portuguese planted them [illegible] The [illegible]

Papayas and Avocados from Tropical America Have Spread Around the World

[illegible]

Avocado and Papaya, Gifts of the Aztecs

Two fruits, avocado and papaya, have become important in tropical areas around the world. One of these, the papaya, is little known in the United States. The avocado, on the other hand, is widely shipped from the limited areas where it can be grown, in California and Florida, to markets all over the country.

In this country, avocados are used mainly in salads or desserts. In parts of Mexico and Central America, however, they are often used as a meat substitute; an avocado is rich in protein and contains up to 30 percent of its weight in oil.

A Native American

The avocado, grown long before the discovery of the New World, is native to Mexico and Central America. Two varieties are recognized by botanists and horticulturists, and both are now important in commerce. The Guatemalan avocados, *Persea americana*, are relatively thick skinned and ripen their fruit mainly in winter and spring. A subgroup of this species, called the West Indian race, ripens the fruit mainly in summer and fall.

The Mexican race, *P. drymifolia*, has much thinner skinned fruit and is slightly hardier to cold than the Guatemalan and West Indian races. All of the races cross freely, and some of our most valuable avocado varieties appear to be hybrids. Enough varieties have been developed to make mature fruits available practically every month in the year.

The avocado was being extensively used by the Aztecs and other natives when the Spaniards arrived. It is today an important part of the native diet where it grows. Tortillas, avocado, and coffee are considered an excellent meal for natives of Mexico and Central America.

Aztec picture writings had a sign for the avocado. The early Spanish spelling of the Aztec name was *ahuacatl*, but many modifications developed. The English name, avocado, is derived from the Spanish modifications of the original Aztec.

Before the Europeans came to these shores, avocados were growing in much of Mexico and in northern South America, possibly as far south as Peru. They were probably not present in the West Indian islands.

European visitors recognized the value of the rich, oily, nutritious fruit. Even so, it was slow to be transported to other tropical countries, perhaps because it does not propagate very readily.

It was growing in the Hawaiian Islands as early as 1825, and has since been widely distributed in Africa and Indonesia. There are now plantings in most parts of the world where the climate is suitable.

The avocado apparently was not established in the United States until the last century. The first trees of definite record in Florida were brought from Mexico in 1833 by Henry Perrine, a well-known horticulturist, and planted south of Miami. Successful introduction into California was even later. The first recorded planting there was in Santa Barbara in 1871, also with Mexican trees.

The papaya, *Carica papaya*, or melon tree, is a unique contribution from the Americas. This very large, melonlike fruit is still unfamiliar to most Americans, though it spread quickly to other tropical countries after Columbus reached these shores. Before 1600, it had reached the Philippines, India, and probably Africa. Its showy, high-quality fruit and its ease of transport and propagation by seed account for its rapid spread—so rapid that for a time there was question as to whether its original home was America or Africa or India.

There still is uncertainty as to whether its native habitat is the West Indian islands or the mainland of Mexico, or both. Its American origin, however, is well established.

The papaya grows on a giant herbaceous plant, rather than on a tree. The fruits, which range from a pound up to 20 pounds in size, will mature in about 18 months from the time the seed is planted. In frost free countries plants will produce for several years.

Papaya Juice Makes Tough Meat Tender

The papaya also produces an enzyme, papain, which has become an article of commerce. It resembles pepsin in its digestive action and is used for the treatment of certain digestive ailments. Its major use is as a tenderizer of meats. The principal commercial source of papain is India.

Outside America, the papaya ranks as one of the most important tropical fruits. It is used extensively in Hawaii and is of major importance in tropical Asia and Africa. It is grown only in limited quantities in the United States, almost entirely in southern Florida. The heavy, very tender fruit is difficult to ship.

The avocado, too, is so tender to frost that areas of production in the continental United States are very limited. Most of our avocados are grown in sections of California south of Los Angeles and near the coast. A second important area is south Florida. Neither avocados nor papayas will tolerate temperatures more than a degree or two below freezing. Avocados can be shipped readily, however, and many an American who never saw an avocado tree is appreciative of this gift from the Aztecs.

Pineapples, Sweet and Spiny, Are Americas Most Important Fruit Contribute Wood

Columbus Found Pineapples in America

FEW Americans know what a really good fresh pineapple tastes like. Only those who have traveled or lived in the Tropics where they are grown know the soft, sweet, juicy fruit as it comes fully ripened from the plant. We can get just an inkling of the flavor by comparing sweet canned pineapple juice made from ripe fruit without adding sugar with the hard, tart fresh pineapples sold in grocery stores.

There is a reason for this great difference. In the pineapple plant, a large quantity of starch is stored in the stem. Just before ripening, this starch turns to sugar and is carried into the fruit; the sugar content sometimes increases 100 percent in this last stage.

Unfortunately, fresh pineapples cannot be successfully shipped very far after they are fully ripe. For this reason, combined with the fact that a raw pineapple is troublesome to prepare for eating, Americans eat most of theirs out of cans.

Indians Pronounced It "Excellent"

The pineapple, *Ananas comosus*, native to South America, is one of the most esteemed and widely grown of tropical fruits. Of all the fruits native to the Americas, it ranks first in worldwide importance, and is second only to the banana among fruits grown in tropical countries.

Columbus found the pineapple on the island of Guadeloupe at the time of his second voyage, in 1493. The pineapple, however, apparently is not native in the West Indies but had been taken there by the Indians. The native home appears to be Brazil and probably Paraguay.

Its European name, *ananas*, is derived from a Guarani Indian language, in which *a* signifies fruit in general and *nana* means excellent. This tribe, native to Paraguay, overran the other countries north to Panama, and is believed to have spread the "excellent fruit" throughout northern South America long before the coming of the Europeans. Early Spanish explorers found the fruit both in the West Indies and in Mexico.

The Spaniards gave the name "*piña de Indias*" to this fruit because of the general resemblance of the fruit to the pine cone. The English called it pineapple—although it has no resemblance to apple either in appearance or flavor. Other European tongues have retained the native name, or slight modifications of it.

After the discovery of America, the fruit was quickly disseminated throughout the world. The fruit generally is seedless but the suckers by which the plants are propagated will stand long handling and still grow. There was no problem, therefore, in distributing plants, even by the slow sailing ships of the 16th century.

It was not only in tropical countries that the pineapple created interest. Fruits taken to Europe were greatly esteemed, and soon gardeners of northern Europe were attempting to produce them under glass.

A wealthy merchant of a small town near Leiden, in the Netherlands, is credited with being the first to produce mature fruit under glass, early in the 18th century. Soon many glasshouse growers in England and other European countries were producing fruit in quantity for sale, and numerous publications described in detail the methods used.

This industry flourished during the 19th century, and some fruit is produced under glass at present. In the Azores, particularly, growing pineapples under glass for the European trade is a principal industry. Large-sized, high-quality fruit can be grown; but the development of large outdoor plantations in the Tropics, together with improved shipping facilities, have made commercial production under glass generally uneconomic.

Pineapples grow on an herbaceous plant with stiff, large, grasslike leaves. New plants are produced by setting the offsets, or shoots, taken from the mother plant. Because the leaves contain tissues especially adapted for retaining moisture, pineapples can survive long periods of dry weather and are often grown in semiarid regions.

Moisture Conserved by Holes in Paper

Where commercial production is on a large scale, as in Hawaii, ground where pineapples are to be planted is often covered first with asphalt-treated paper to conserve moisture. Shoots are set through holes in the paper, and moisture which collects on the leaves from rain or dew flows inward to the stem and down through the hole.

Between 15,000 and 20,000 plants are set to an acre. In 12 to 18 months after setting, each of these produces a single fruit, on a stem usually two to three feet high. After the fruit is harvested, the shoots along the stem will grow and produce a second crop about 12 months later. Under favorable conditions plantings will last for years, but the size of the fruit tends to decrease. In commercial production, two to five crops are harvested before the plantings are torn out and reset.

About four-fifths of the pineapples entering world trade come from Hawaii, and most of these are sold in the United States. Shipments of juice to the mainland total more than 80,000,000 gallons a year, and an equal volume is sold as canned fruit.

In Most Temperate Lands Strawberries Are the First Fruit of Spring

[illegible] the early 1970's

A Pan American Union Produced Our Strawberries

[illegible] berry. In large commercial plantings and small gardens we devote approximately 180,000 acres to growing it. The annual crop has a cash value of more than $45,000,000.

The berries are sold fresh or frozen for breakfast or dessert fruit; cooked and canned, or made into uncooked preserves; or combined with other ingredients into two of our most popular confections, strawberry shortcake and strawberry ice cream.

Because they are easy to grow, strawberries are found in many home gardens. Spraying is generally not necessary; a moderate amount of cultivation, weeding, fertilizing, and occasional transplanting are all the care they need. They are also one of the few crops which part-time farmers can easily turn into profits.

The plants will grow on soils ranging from sand to clay, and in climatic areas from Florida into Canada and Alaska. In colder parts of the country, beds must be covered in winter, usually with from one to six inches of straw.

Breeding and Cultivation Began Late

Although species of strawberry are native in most of the temperate regions of the world, the large-fruited, productive varieties of the present have come from the union of species found in the two Americas. As an important cultivated fruit, the strawberry is a recent addition to world horticulture.

Wild strawberries were found over much of Europe from the earliest days, being mentioned by Virgil (70-19 B. C.) and Pliny the Elder (A. D. 23-79). Not until centuries after, however, is there evidence of cultivation. Berries from the wild were taken into gardens at least by the 15th century. These European species bore fruit of good quality and were especially notable for their aroma, but the fruits were small and the plants bore sparingly. Little improvement in size or yield occurred under cultivation.

When the colonists landed in eastern America, they were amazed at the abundance, plant vigor, and fruitfulness of the native strawberry, *Fragaria virginiana*. "Wee cannot sett downe a foote but treed on strawberries," a colonist from Maryland wrote home to England.

This strawberry was taken to France; the date, as given by Jean Rodin, gardener to Louis XIII, was 1624. From France it was taken to England and other European countries and was extensively grown in gardens. The berries, even under cultivation, remained small, although of good flavor and much more productive than the old European kinds.

The next great event in the history of the strawberry was the introduction of plants from Chile, South America. Long before the white men arrived, the Indians of Chile had cultivated a strawberry better than the European or the wild North American varieties. Some plants bore fruit as large as walnuts. A Frenchman, Captain Frezier, observed these strawberries and took plants to France in 1712. A few years later, the Chilean berries, *F. chiloensis*, were taken to England.

It seems probable, although direct proof is lacking, that European gardeners in many cases planted the Chilean and the North American kinds in the same gardens. Seedling plants which were crosses of the two kinds originated by chance. Some of these were large-fruited, vigorous, productive plants, the ancestors of our modern varieties.

Not until shortly before 1800, however, were these improved varieties listed by American nurserymen. One of the first of these, a variety from Europe named Pine, but with *F. chiloensis* in its ancestry, became a parent of many varieties produced in this country. By 1825, strawberry growing was well established in home gardens, and commercial culture near the larger cities was developing.

In 1838, Charles M. Hovey, a fruit grower, breeder, and writer on fruit culture at Cambridge, Massachusetts, introduced a variety which he had grown from seed produced by cross-pollination. This variety, named the Hovey, not only was a sensational improvement in strawberries but represented, so far as is known, the first fruit variety of any kind originating as a result of definite breeding effort in the United States. It proved a great stimulus to fruit breeding.

Improvement Projects Under Way

Since the latter half of the 19th century many amateur breeders have crossed and selected strawberries, and the general quality of the varieties has continually improved. In addition, several of the State experiment stations and the U. S. Department of Agriculture have large-scale breeding projects for improvement of this fruit. Most of the outstanding new varieties of the past 20 years have come from this State and Federal work.

Strawberries are grown to some extent in every State in the Union. Largest centers of commercial production are in Louisiana, Tennessee, Arkansas, Oregon, California, North Carolina, and the sections of Maryland, Delaware, and New Jersey east of Chesapeake Bay. Commercial production is carried on in almost every State, however, and in all other nations of the Temperate Zones the "Pan American" strawberries are the kinds principally grown.

Flowers, Blackberries and Raspberries Were Prized for Handkerchiefs and Clothing

Fruits That Grew Among the Brambles

MAN [illegible] bramble tore at his skin, has stayed to pick the fruit that grew on it. In almost any part of the temperate world, this fruit would probably be either of two closely related kinds, blackberries or raspberries.

These two berries, both members of the rose family, have similar histories. Both are native to Asia, Europe, and North America. If raspberries go a little farther north (to the Arctic) and south (to the Equator), blackberries are generally more abundant in temperate regions.

Both are quick to spring up in neglected fields, and for many years were more apt to be mowed or plowed under than cultivated. Their very abundance kept them from commercial planting and scientific breeding until comparatively late in horticultural history.

Raspberries were first mentioned in agricultural writings by the Roman naturalist Pliny in the 1st century. He spoke of wild raspberries as having come from Mount Ida, in Greece. Centuries later the great Swedish botanist Carolus Linnaeus gave the name *Rubus idaeus* to the common form of the European red raspberry, because of this early reference to Mount Ida.

"An Afternoones Dish to Please the Sicke"

The raspberry was mentioned so seldom in early European writings that it is apparent that the fruit was of little importance. Not until 1629 did an English writer more than mention the fruit. In that year a work on orcharding devoted a short chapter to raspberries. It described red and white kinds, and recommended them for "an afternoones dish to please the taste of the sicke as well as the sound."

During the 19th century many varieties of high quality were selected or developed from breeding efforts, particularly in northern European countries. Raspberries there are mainly derived from the native European species, *R. idaeus*, and many of the varieties are richly flavored.

In America early colonists found raspberries growing abundantly. Two kinds were common, the red raspberry, *R. idaeus strigosus*, quite similar to the European, and a black-fruited kind, *R. occidentalis*, now known as the black raspberry or blackcap raspberry. From these two American species, and from hybrids with the European species, our cultivated American varieties have been derived.

Named varieties appeared in America at about the same time they did in Europe. Several are named in the *American Gardener's Calendar*, published in 1806, one of the first books published in America dealing especially with gardening and orcharding.

Beginning about the middle of the 19th century, great interest developed in America in the breeding of fruits, including raspberries. The most prominent of the raspberry breeders was Dr. William D. Brinckle, a physician who spent most of his life in Philadelphia. Fruit breeding was his avocation, and he introduced several excellent red raspberries. The variety now probably most widely grown, the Latham, was originated by the Minnesota Experiment Station.

Blackberries Grow High and Low

While blackberries have been divided into hundreds of species, two major kinds occur both in Europe and America. These are the upright growing forms and the prostrate, or trailing, forms, often called dewberries. How this name originated is uncertain. Perhaps it was because the berries frequently were covered with dew when gathered.

The upright blackberries not only have stiff, erect canes but are generally very thorny. They propagate by suckers from the roots. In contrast, the trailing blackberries of America have slender canes, are much less heavily thorned, and do not sucker. The tips of the canes, if in contact with the soil, strike root and establish new plants. In general, the upright forms have a strong flavor, with a somewhat bitter aftertaste. The trailing forms are usually milder flavored.

In America blackberries thrive in all except the coldest or driest parts of the country. They are particularly abundant along the eastern seaboard, west to the Plains, and throughout the southern half of the country. Texas is particularly rich in this fruit. Two very high-quality species of dewberries also grow along the Pacific Coast.

In Europe blackberry culture seems to have occurred mainly in the past 50 years; in America it started somewhat sooner. In 1850 a lush-type variety, Dorchester, was named in Massachusetts, and remained a valuable variety for nearly half a century. About 1875 a dewberry, the Lucretia, was discovered in West Virginia and transplanted to Ohio. This is still the leading dewberry in more northern latitudes.

In recent years, three high-quality trailing types have been widely grown. These are the Youngberry, bred by B. M. Young, a private breeder of Morgan City, Louisiana; the Loganberry, apparently a cross between the Pacific trailing type and the raspberry, which originated in the garden of Judge J. H. Logan at Santa Cruz, California, and the Boysenberry, a variety quite similar to Youngberry, of chance origin in California. Unfortunately, all are tender in the colder parts of the country.

Pilgrims Found Cranberries Ripe and Ready for the First Thanksgiving Dinner

Indians Taught Us to Use Cranberries

WHEN the Pilgrims landed at Plymouth Rock, they found a thornless vine growing thick over most of the low, semi-swampy areas. On the vines were red berries, unfamiliar and bitter to the palate.

Later the Pilgrims learned that the Indians valued these berries highly, both as food (probably pounded with meat into a paste called "pemmican") and as a poultice for blood poisoning. The Indian name for them was *Ibsuai*, "bitter berry." The colonists, perhaps because the berries were a favorite food of cranes, called them crane-berries, and eventually, cranberries.

It would be pleasant to say definitely that the Pilgrims ate cranberries with their turkey and bear meat at the first Thanksgiving dinner, but there is no sure evidence that they did. The record of that feast, contained in a letter believed to have been written by Governor Edward Winslow, tells that fowl hunters were sent out and killed enough fowl in one day to serve the company for a week.

Chief Massasoit and a party of his tribe joined them for three days and added three bears to the larder. Cranberries would have blended admirably with this menu; the Indians were familiar with them; and at that season of the year they should have been plentiful. Beyond that the evidence does not go.

Berries That Thrive Under Water

The American cranberry, *Vaccinium macrocarpon*, is native from Nova Scotia, Canada, to North Carolina and westward to Wisconsin. It is found mainly in low, swampy sites, particularly those that flood in winter and drain in summer. The coast of Massachusetts, particularly Cape Cod, was a rich center of native cranberries in colonial days; it still leads in production today.

For nearly 200 years the settlers were content to harvest their cranberries from wild vines. This wild crop was a considerable source of revenue on many farms. Early in the 19th century the first attempts were made to transplant and cultivate the fruit.

Henry Hall, a veteran of the Revolution, is credited with being the first to try. About 1816 he transplanted wild vines to a swampy site near Dennis that appeared favorable for cranberries. His efforts were apparently successful. In 1852 the local paper printed a story of his work, stating that his crops averaged about 70 bushels per acre production.

Soon other growers in Massachusetts were planting cranberries; a little later culture was started in New Jersey. Many plantings failed before growers gradually learned the conditions essential for success. They learned that bog areas with peat soil were favorable; that these should be leveled and the surface layer removed to eliminate weeds; that they should be well ditched to provide drainage, but should also be built so that they could be flooded during the winter, both to protect the vines from cold and to control insect pests.

Thus in the last century cranberry growing has evolved as one of our most intensive and complicated horticultural industries. Expensive preparation is necessary before planting. Practically all bogs are built so that they can be flooded and drained quickly, either by large pumps or by natural flow. Sand is spread over the peat to promote the growth of vines. Problems of insect and disease control must be solved.

Yet the industry has grown until about 800,000 barrels are produced in an average year, mainly in Massachusetts, Wisconsin, New Jersey, Washington, and Oregon. Massachusetts is by far the leading state, raising more than half the Nation's crop.

The earliest plantings were made with unselected wild plants, but soon growers began to choose highly productive plants with especially fine berries. These were propagated and became the basis of the present industry. Modern growers have produced as many as 100 bushels of cranberries on a single acre.

Cranberries are picked by hand or with large, rake-toothed scoops which are pulled through the vines and remove the berries. Since some of the berries are usually bruised, damaged, or decayed, they must be sorted before they are sold.

The method, common in earlier times and still used in principle, was to roll the berries down a series of 10 to 30 steps. The good ones, being firm, bounced to the bottom like little rubber balls; the damaged berries, being soft, stayed on the steps. Machines are now largely used for grading, but even these depend on the ability of the good berries to bounce.

Equally Good on the Fourth of July

The American cranberry has not become a cultivated crop outside the United States and Canada. In the far north of Europe a related, but smaller-sized, fruit is abundant as a native plant, and great quantities are harvested. Neither the European species nor the American is extensively cultivated in Europe.

The tradition that helped to give cranberries their start in America has in recent years held the industry back. Growers and canners, producing far more berries and sauce than consumers can possibly eat at Thanksgiving season, have sponsored publicity campaigns to persuade housewives that cranberries are good to eat the year around, not just on one Thursday in November.

Blueberries Are Crops That Raise Themselves

WHEN forests are cut or burned away, blueberries are often among the first plants to spring up on the cleared field. Frequently they become the dominant vegetation, providing the landowner with a paying crop that requires little care except for harvesting.

If the field is completely neglected, however, taller shrubs and trees soon grow and shade or choke out the blueberries. Thus in New England and other areas where native blueberries are harvested, it is a common sight to see a farmer burning or mowing his blueberry fields. The berries quickly spring up again; the second year after burning a maximum crop will be ready. Some farmers fertilize the fields occasionally and also dust or spray them to control berry worms. On many farms this wild crop is a principal source of income.

The blueberry group is probably the most widely distributed fruit in the world. Species of this group are distributed over much of Asia, Europe, and North and South America. They extend from the Tropics to the northern limits of human habitation. They are a valuable addition to the diet of the Eskimos.

Although widely distributed and widely used as food, only in the United States and Canada is the blueberry a cultivated, horticultural crop. All of the blueberries grown in North America have been bred from species which are native here.

If You Feel the Seeds, It's a Huckleberry

There is great confusion in the common names blueberry and huckleberry. In some areas the names are used interchangeably. The U. S. Department of Agriculture and most botanists and horticulturists now use the name huckleberry for the berries belonging to a related group of plants that have 10 rather large bony seeds which are noticeable and somewhat objectionable when the fruit is eaten. Blueberries, on the other hand, have a large number of very small, inconspicuous seeds—so small that they are not noticed when eating the fruit. Only the blueberries are grown as a horticultural crop.

The blueberry thrives only on acid soil. Various species occur over most of the United States and Canada east of the dry prairies. Along the west coast, especially in mountain sites, blueberries also thrive abundantly.

The blueberry still is gathered in quantities from the wild. The coastal counties of Maine, the Appalachian plateau from New England to Georgia and Alabama, the Ozarks of Missouri and Arkansas, and the Cascade and Coast Range mountains of the Pacific States are areas where picking and selling wild blueberries is an important industry. Cash value of the annual wild blueberry crop in the United States has been estimated at between $8,000,000 and $10,000,000.

The fruit of at least seven species is harvested on a fairly large scale. The most important species is the low bush blueberry, [illegible], the dominant kind from New England west to Minnesota. Second is the high-bush blueberry, *V. corymbosum*, found throughout the Atlantic Coastal Plain from New England to Georgia, and westward to Lake Michigan.

Improvement of blueberries by breeding is the work of the past half-century. Two names stand out in the story of this research. One is Dr. Frederick V. Coville, long a botanist of the U. S. Department of Agriculture; the other is Miss Elizabeth C. White, a pioneer grower in Whitesbog, New Jersey. Miss White offered cash prizes for the native high-bush plants producing the largest fruit, and thus was able to assemble many large-fruited [illegible].

Dr. Coville and Miss White made crosses, starting in 1909, among these superior plants. The breeding work was continued until Dr. Coville's death in 1937. Miss White has continued her research to the present.

As a result of this work, 18 varieties having large fruit, attractive color, and ripening over about a two-month period have been introduced. These varieties today constitute the extensive cultivated blueberry industry in New Jersey, Michigan, North Carolina, and other States. The fruit of some of them is more than double the size of the largest wild berries.

In the far South, the rabbit-eye blueberry, *V. ashei*, is cultivated on a considerable scale. A number of varieties have been selected from the wild, but only in the past decade has systematic breeding been undertaken. This species is well adapted in the area within about 300 miles of the Gulf of Mexico. Between 3,000 and 4,000 acres are devoted to growing them in northwestern Florida and near-by States.

Mulch Is Best for Growing

Because of the exacting requirement of the blueberries as to soil, they are not widely adapted to upland garden culture. They can be grown on many acid soils, particularly if the soil is kept mulched. A heavy mulch of sawdust, oak leaves, or similar material seems to provide the best growing conditions.

In small gardens, birds, lovers of blueberries, frequently will harvest the crop before it is fully ripe. Covering the plants before the fruit begins to ripen is about the only way to save the fruit where only a few bushes are grown.

Blueberries, Most Widespread of Wild Fruit Food Producing Bushes and Lebanon

[illegible]

Two Berries Known Best for Their Jelly

CURRANTS and gooseberries, spicy-flavored berries used in America chiefly for cooking, are prime examples of how fruit can be improved and yields increased by cultivation and breeding. In its wild state, a gooseberry weighs somewhat less than a quarter of an ounce. Under culture, gooseberries have been increased to eight times this size, with individual berries weighing up to two ounces.

At an experimental farm in Ottawa, Canada, currant bushes of the Pearl variety have been grown for years with an average yield at the rate of 12,402 pounds per acre. Peak yield has been at the rate of more than 13 tons an acre.

Currants and gooseberries, related fruits of the genus *Ribes*, are native in the colder parts of Europe and North America. While they are planted in many home fruit gardens in the northern half of the United States, they are not nearly so important here as in the northern European countries. In England especially they are grown in great quantities and eaten both as fresh fruit and in jams, pies, and puddings.

The European history of these two fruits is very similar. Neither is well adapted to culture in southern Europe, and neither is mentioned in early horticultural writings from the Mediterranean countries. Species from which the cultivated varieties were developed are native over most of Europe, but in southern areas grow only in the high mountains. Thus it was not until agriculture and horticulture developed in northern Europe that these fruits attained any importance.

Both currants and gooseberries were first mentioned as garden fruit plants about the time of the discovery of America. References in English writings begin about the middle of the 16th century. At least one German writer described currants in some detail late in the 15th century. Both fruits probably first attained importance in the Low Countries of Europe, particularly the Netherlands.

Dried "Currants" Are Ready Grapes

The name currant is misleading. It apparently derives from the resemblance of the berry to the currant or Corinth grape, a small-fruited, seedless grape long grown for drying. So-called dried "currants" of commerce, to the present time, both in Europe and America, are actually dried grapes of this type, and not really currants at all.

The origin of the name gooseberry is less certain. The obvious assumption is that it was once largely served with goose. It seems more probable, however, that the English name is derived from the Dutch name *kruisbes*, literally, "cross-berry."

The currant was listed with other fruits and crop plants sent to the Massachusetts Bay Colony in 1629. Gooseberries also were sent to the New World then, or shortly thereafter, though we have no specific record of the date. The European currants thrived so well in America that little effort has been made to improve our native kinds, although many species of currants are native here. The white and red varieties commonly grown are derived mainly from the European species *Ribes sativum* and *R. rubrum*. The best commercial varieties are probably hybrids of these two species.

Black currants of the species *R. nigrum* are extensively grown in northern Europe, and have long been said to have medicinal value. Recent research has shown that they are extremely rich in vitamin C. They are not grown to any extent in this country.

The European gooseberries, *R. grossularia*, thrive in the United States only in the cool Pacific Coast regions where summers are dry. In the more humid eastern States, the mildew disease attacks the plants of European kinds so severely that culture is difficult.

Selections of native American species resistant to the mildew, mainly *R. hirtellum*, began to appear in American fruit catalogues about a century ago. A little later, varieties that apparently are natural crosses of European varieties and the Americans were selected, and today are the important kinds grown here. They combine the quality of the Europeans with the disease resistance and the heat tolerance found in native kinds.

Host to an Enemy of the Pine

The white pine blister-rust disease is extremely destructive to the white, or five-needle pine, one of our most valuable forest trees. Species of *Ribes* are agents in the spread of this disease. The blister-rust fungus does not spread from pine to pine, but undergoes one stage of its development in the leaves of currants and gooseberries.

For this reason, Federal and State Governments have spent millions of dollars to eradicate native *Ribes* in areas where the white pine is important. For the same reason, planting of currants and gooseberries is prohibited by law in the areas of the country where white pine is of major importance.

Where growing these fruits is permitted they are valuable additions to the home gardens in the northern half of the country. They are little used in this country as fresh fruit; gooseberries are most often picked for cooking while still green. They are prized by those whose ancestry traces to northern European countries, where these tart, strongly flavored fruits are traditional favorites.

Cornus and Clematis as they grow in Northern Forests and on Mountainsides

[illegible]

Even a Sour Persimmon Can Be Sweetened

IN the South, small children sometimes dare one another to bite into a green persimmon. The one foolish enough to accept the challenge undergoes a form of torture which cannot be adequately described. One sufferer put it this way: "Your mouth feels as if it's trying to turn itself inside out. It's not exactly sour, but it's puckery."

Two species of persimmon are commonly grown in the United States, one native, one imported from the Orient. Most varieties contain measurable quantities of an acid called tannin which, when the fruit is green, produces the mouth-twisting effect for which the persimmon is famous.

The Oriental persimmon, *Diospyros kaki*, is one of the popular fruits of subtropical Oriental countries. Hundreds of varieties are known in the southern islands of Japan and in the south-central part of eastern China. The species is not definitely known in the wild. It evidently originated in the southern part of China, possibly from an amalgamation of native species. That area has been so little explored by western botanists that the origin of the cultivated form is uncertain.

The *kaki*, as it is known in Japan, is a truly subtropical fruit. It is not well adapted in the Tropics, nor will it endure winter temperatures below about 10° F. Trees grow up to 40 feet high and, like native American persimmons, are usually dioecious—that is, a single tree bears only female, or pistillate, flowers, or only male, or staminate, flowers. Both kinds must be present in a planting for satisfactory fruit production.

To Sweeten, Cover and Seal Tightly

Some varieties of Oriental persimmons are astringent and puckery until dead ripe, like our native kinds; others are mild flavored. The tannin which causes the astringency can be rendered tasteless by sealing the fruit in tight containers for several days. In the Orient, the fruit is often placed in tubs from which saki (rice beer) has been removed, and the tubs tightly covered. The presence of alcohol was long believed helpful in removing the astringency, but apparently is not necessary.

From Japan and China, the Oriental persimmon has gone around the world, but its popularity in other countries has been limited. It reached France early in the past century, but seems not to have arrived in the United States until after Admiral Perry visited Japan in 1853. It was about 1870 that grafted trees of the better varieties were introduced, largely through the efforts of plant explorers of the United States Department of Agriculture.

During the early years of the 20th century, there was wide interest in these fruits throughout the southern States, particularly Louisiana and Florida, and in California. In many cases propagation was poor because of failure to provide pollinating trees. Also, in spite of its good qualities, the fruit was unknown on American markets and did not find a ready demand. The abundance of fruits on our markets makes the introduction of a new and little-known kind difficult. Today persimmons enjoy a steady but moderate sale. Through a large area of the South they are especially valuable for home gardens and local markets. The trees bloom very late, and blossoms are rarely destroyed by spring frosts.

The American persimmon, *D. virginiana*, is a fairly abundant tree throughout the southeast quarter of the country. It occurs most frequently from central Kansas and Nebraska eastward to Maryland, Virginia, and the Carolinas. A few trees are found as far north as southern New England and Michigan.

"Delicious as an Apricock"

The native persimmon impressed early explorers and settlers as a promising and valuable fruit. Capt. John Smith wrote soon after settling at Jamestown: "Plumbs there are of 3 sorts. The red and white are like our large plumbs; but the other which they call Putchams grow as high as a pattern. The fruit is like a medlar; it is first green, then yellow and red when it is ripe: if it is not ripe it will drive a mans mouth awrie with much torment; but when it is ripe, it is as delicious as an apricock."

Even more than the Orientals, the native persimmon must be dead ripe to be eaten without causing puckering.

Only sporadic attempts have been made to improve the native persimmon. Trees bearing superior fruit have been selected from the wild. During the 19th century, a good many gardeners collected persimmon trees, the poet William Cullen Bryant was an ardent persimmon enthusiast.

Improvement, however, has never gone further than this selection of wild trees. The work that has been done in breeding blueberries indicates what could be accomplished by similar work with the persimmon. If the native variety could be successfully crossed with the Oriental, the possibilities of improvement would be enormous.

In the meantime, persimmon lovers will continue to seek out native trees in the late fall, shake down the dead-ripe fruit, and eat it out of hand or take it home for the preparation of persimmon pudding, persimmon cake, or other culinary delights.

Persimmons Are Good When Ripe—but Don't Bite Into a Green One!

A Stroll to Venice

By Isobel Wylie Hutchison

"THE DOLOMITES," said an Austrian friend in Innsbruck (page 357), "are, I believe, the most beautiful of all places in the world! They are not to describe, only to see."

And so, on a brilliant May morning, I set out to see them with a knapsack on my back, planning to go through the Brenner Pass and over the Sella and Rolle Passes to Venice (Venezia) by way of the Dolomites. Surely no scientist has a grander memorial than the French geologist Count Déodat de Dolomieu, born in 1750. He was the first to describe as magnesium limestone the composition of many peaks which now commemorate his name.

"Begin your walk at Igls and go over the hills to Mattei by the old post road," my friend advised. "The Romans used to bring salt that way from the mines at Hall."

The old salt road seemed the right path to take for Venice, Queen of the Sea, for, like her on an alien background, she has risen above the waters through the ages, the work of man. With bright hopes, destined to be more than fulfilled, I took the mountain railroad for Igls, near Innsbruck (map, page 360).

Highway of History

It was Whitmonday. Holiday crowds in holiday clothes filled the train. Many girls wore the national costume. I planned to reach the village of Matrei, 13 miles from the Italian frontier at Brenner Pass, by evening. The Brenner is the lowest of the Alpine passes, though its highest point, 4,511 feet, is Britain's tallest peak, Ben Nevis.

Here, up the long valley of the Isarco, or Eisack, River, a tributary of the Adige, Mediterranean vegetation has penetrated further into the Alps than elsewhere. The Brenner has thus been a favorite highway between central and southern Europe since earliest times (page 355).*

It was through its winding ravine, say many historians, that conquering Roman legions came in 15 B.C. under Drusus, stepson of Emperor Augustus. In the reverse direction streamed hordes of Goths and Ostrogoths, Cimbri and Bavarians, on their equally victorious way south.

In our own day, in their notorious meeting at Brenner station on October 4, 1940, came Hitler and Mussolini, to dilate on their plans for the conquest of Europe. The roaring waters of the gray torrent outside the windows of their armored train were less fleeting than the plans of the two dictators, for since 1929 these streams have been harnessed and their waterpower used to electrify the railway which crosses the pass.

The old road from Igls to Matrei twists along the hillside hundreds of feet above the railway and trunk road in the valley. From its height the hurrying cars and occasional train seemed dwarfed to the size of toys.

So perfect was the scene I might have stepped into the wings of a theater. The flowers, the frescoed houses, and gaily clad throng seemed unreal. In the crystal-clear atmosphere the snow-dusted ranges behind the Inn River Valley stood out like cardboard scenery.

Scented pinewoods enclosed me as I walked on. I heard the click of cowbells, and somewhere a cuckoo called. I stopped to turn the money in my pocket and take my direction, for a long road lies before you when the first cuckoo of the year is heard. Sure enough I was [illegible] south, and [illegible] me from Venice.

At St. Peter I found a little church clinging to the hillside, with gay cherubs holding up its pulpit, a richly painted ceiling, and a blue Madonna enshrined in gold above the altar. A cock topped the stately spire. The few country folk I met gave me the lovely Tyrolese greeting, "*Grüss Gott.*"

Beyond St. Peter the road descended to the picturesque stream and mill at Mühlthal. The cobbler's frescoed house, with its brilliant window boxes and overhanging eaves, was like a fairy tale. Cheek by jowl with the Old World mill, iron pylons harnessed the power of the little waterfall and stalked away over the hill with their electric treasure.

Only a Picture Remains

The Sill, a tributary of the Inn, races past the long village of Matrei (pages 379 and 388) and plunges through a gorge [illegible] Above on a high rock, the Castle of [illegible] stood until 1944, when it shared the fate of the railway bridge below, which was bombed by the Allies.

The old post road wound around this rock and entered Matrei by a wooden bridge watched over by a saint in his niche. As I stood gazing at the ruined castle, an old man hobbled up.

"You are looking for the castle?" he asked. "Yes, it is gone. It was very old. But you can see its picture, just as it was, on the side of the third house as you enter the village."

And there I found it, complete with Gothic tower.

* See "[illegible] the Alps to Brenner Pass," 15 illus., National Geographic Magazine, December, 1944.

Skin-clad Barbarian Hordes Once Marched Like This Through Historic Brenner Pass

[illegible]

[illegible] just the [illegible] the little fruit [illegible]

[illegible] I suggested, [illegible]

"Not as it was," [illegible]

[illegible] old are rising from the [illegible] decorate their [illegible] where [illegible]

Above the hat [illegible] bonnet [illegible]

[illegible]

[illegible] National Geographic Magazine [illegible]

Drawn by H. E. Raymond and Jean E. Allen

The Stroll to Venice Started in Austria's Mountains

From Innsbruck, heart of the Austrian Tyrol, the author crossed Brenner Pass, where she saw both relics of Roman times and ruins of World War II. Ancient inns and quiet villages held memories of Goethe, Robert Browning, princes, emperors, and, more recently, of Allied soldiers and armor hiding or escaping from German patrols.

sat under a big umbrella and ate ice cream with Tyrolese farmers out for the day.

Austrians Protect Wild Flowers

Next night I spent at the pretty village of Gries, three miles from the frontier. I found my way [illegible] the rushing Sill, then climbed through steep [illegible] where I saw my first Clue gentian. There it grew, beside a vivid patch of its smaller sister, *Gentiana Acaulis*.

The large gentian, as well as one or two other coveted flowers such as the martagon lily and the auricula, is protected in Austria. Notices in railway stations bear pictures of these flowers, with the request that no roots be taken and only one or two picked. The Austrians love their wild flowers. They have issued a fine series of postage stamps bearing delicate engravings of ten admired species.

In a gray cool dawn I left Gries next morning for the 15-mile walk across the frontier to the old Roman station of Vipiteno, which belonged to Austria in the days before World War I when that empire stretched beyond Trent (Trento).

The poet Goethe passed by this route in his post chaise on the night of September 10, 1786, as he relates in his *Italian Journey*. Goethe, however, made more rapid headway than I did, for his longing to reach Italy was impetuous.

"It grieved me," he wrote, "to pass this magnificent scenery with such frightful haste, by night, as if in flight; and yet I rejoiced heartily that a favorable wind blew me on, keeping pace with my desire."

Since Italy had come to meet me at the Brenner, I had no such reason for haste. So I sat down under a fir tree to admire the rather gloomy pass, hemmed by towering wooded cliffs, their tops shrouded in mist.

The Sill, now a mere brook, foamed at my right, getting still narrower as the road spiraled up. At the summit a grim notice board with skull and crossbones reminded motorists of the dangerous descent.

Beside the road is an enclosure paved with large blocks of stone which once formed part of the old Roman road. Still clearly to be seen in the stone are the grooves of wheels. Feeling very young, I planted my hobnailed shoes gingerly on this pavement which had so long outlived Caesar.

I approached the scarlet stripes of the

Here History Lives: Paving of an Old Roman Road Still Shows Ruts Made by Carts

[illegible]

Austrian *Zollamt* officially. But formalities were negligible [illegible] Austrian soldiers [illegible] Italian line.

I was in Italy! I had crossed the watershed which [illegible] Adriatic from the Black Sea [illegible] the cliffs and raced down the road beside me [illegible] the Adige.

A Trilingual Land

What do you call it? I stood on Italian [illegible] bicycle.

[illegible] called Lack. Had he been an [illegible] he would have said "Pisak." [illegible] names in this part of Europe are still [illegible] confusion. In railway stations and elsewhere the Austrian ones are usually printed under the same Italian ones.

The people too, for [illegible] rules as either [illegible] the Austrian are bilingual, or, [illegible] trilingual. Their speech [illegible] a language [illegible] Latin [illegible] Ladin.

German is [illegible] commonly used as Italian in the northern part of [illegible] Austrian territory. But symptoms [illegible] in a northern direction. The Tyrolese mountaineers are a very individualistic race and would [illegible] prefer to be independent of both their neighbors.

It was 5 o'clock when I reached Vipiteno. I had [illegible] to visit the Strassburg ruin, an ancient keep overlooking the [illegible] which the town lies, [illegible] and watered by the [illegible] Rienza.

Charming Vipiteno is [illegible]

Reifenstein Castle 900 Years Old. Now Boasts Telephone and Electric Lights

Palestrina Fingers Work Exquisite Patterns in Fine Lace

[illegible]

Emperor Francis Joseph Slept Here

[illegible] I set out for Ferrezza, [illegible] miles away [illegible] but I had not gone far when I was diverted by the sight of an enchanted castle [illegible] Spreckensteinerstrasse Kirchstadt.

My oldsters [illegible] Austria's dismantled [illegible] and where [illegible] Emperor Francis Joseph.

I [illegible] to visit such an interesting spot, now [illegible] into decay. [illegible] clambered [illegible] admitted by an elderly woman carrying an enormous bunch of keys. In the courtyard a cherry tree [illegible] tained by a wire fastened around its trunk. A large portion of the outer wall which would otherwise have collapsed at the road below [illegible] Spreckensteinerstrasse Kirchstadt.

[illegible] on the Brenner railway [illegible] from the [illegible] but [illegible] something [illegible] Lindenmaier.

[illegible] and [illegible] in the [illegible] with its [illegible] fully carved [illegible] Francis Joseph and the Empress Elizabeth [illegible]. A finely carved door [illegible] with an old [illegible] Portraits of the Thurn and Taxis family, the castle's owners, decorate the walls. Electric light and telephone [illegible] but here they were.

The sun was high [illegible] Roman-tea [illegible] I rested that evening at a charming old inn, the Golden Horn, at Mauls (or Mules), halfway there.

The village stands in a narrow [illegible] Its church [illegible] weaver and [illegible] keepers find it hard to earn a living.

Bake Day Once a Year

Mauls housewives bake only once, and sometimes twice, a year. They store the hard bread in a dry place and eat it softened in milk or coffee. Grain is ground at the mill, the farmers have their own potatoes, butter, milk and cheese, and the weaver weaves their clothes.

"We seldom need to buy anything," said one of the women, "except a little coffee or sugar."

There are [illegible] Roman burial [illegible] in the wall of one of the town's houses which the

owner found during alterations. It commemorates one "Aurelae Kultur matri achas." There are others a few miles up the valley.

But the traveler from Mauls to Fortezza follows Napoleon's footsteps rather than Caesar's. At Mezzaselva pinewoods rise steeply on either side of a narrow gorge, still called the Sachsenklemme (Saxon Gorge). Here, in 1809, there was bitter fighting between the Tyrolese and Saxon forces under the French. The Tyrolese were victors.

I took a woodland path to escape the traffic and found wild May lilies and the first wild strawberries a tombstone erected in 1902 by the Andreas Hofer Society of Vienna in memory of five officers who had lost their lives in this old struggle for freedom.

At Fortezza the country widens into a fertile plain below the solid fort, built over a century ago to command the pass. Perhaps it was my imagination, but I felt that Fortezza was still hostile to strangers. As I sat in the station waiting (let me confess it!) for a train to carry me the last but 7 miles to Brixen (or Bressanone), a soldier came up and asked where I was going.

How different is Brixen! For more than 1,000 years this friendly town has stood where the brown waters of the Rienza join the gray Isarco (Celtic, "Ice Torrent"). But traces of human settlement in the rich plain go far back into the Bronze and Iron Ages.

About 992, Prichsna (as it was then called) became the seat of a prince-bishop whose authority "no judge, no count, no magistrate" had the right to question. Until the secularization of the principality in 1803, he was the owner of rich possessions and until 1918 had a seat in the Austrian House of Lords.

Perhaps because of its long association with bishops, an atmosphere of spiritual serenity pervaded the cool arcaded streets. The traveler rubs shoulders with Capuchins and Franciscans in their thick brown habits and with black-robed nuns from the church and convent of the Englische Fraulein.

An Elephant at the Inn

As I leaned at night from my balcony overhanging the river I drank in with relish the cool scented air, for a thunderstorm had cleared the fiery heat of the day. I heard men's voices upraised in chorus. They were probably singing the same songs, if not the same words, which their forefathers had sung when the famous elephant passed through Brixen 400 years ago.

Despite its connection with bishops, Brixen is in the popular mind even more closely associated with elephants. Here, in 1551, came a strange guest to the old Herberge am Hohen Feld, as the principal inn was then called. Suleiman the Magnificent had presented an elephant to Archduke Maximilian of Austria. The first ever seen in these parts, it was stabled at the inn, which in commemoration of this singular event was ever after called the Elephant.

For 300 years this hotel has remained in the same family and has probably lodged more royal guests than any other in Europe. Before World War I scarcely a year passed without such a visit, from the Emperor Joseph II in 1789 to the Duchess of Aosta in 1929.

Peddlers and beggars came also to this comfortable hostelry with its benign and friendly atmosphere, for it lies on the direct route between Italy and Austria. Oswald von Wolkenstein, the minnesinger who died in 1445, undoubtedly knew the old Herberge am Hohen Feld, for he was one of the world's greatest travelers. The wanderlust caught him at an early age, as he himself describes.

> There came to me when I was ten years old
> The urgent need the wide world to behold
> Nor did I think that I would never rest
> In service under Christian, heathen, Greek!

Oswald fought against the Turks in 1390, was present at the storming of Ceuta, traveled in Persia, Asia Minor, Italy and Spain, England, Portugal, and the Holy Land, and took sides with James Douglas against the English at the Battle of Otterburn (1388).

Oswald—Two Versions

On the memorial tablet in the wall of the old cemetery behind the Cathedral, he is depicted as a bearded figure clad in a short skirted garment not unlike the kilt.

Six weeks later I found his portrait at Innsbruck in a magnificently illuminated volume of his poetry. It shows him with one brown eye open and one—lost at an early age—shut. He wears a purple hat trimmed with fur, a red jacket embroidered in gold, and his large benign countenance reminded me of Winston Churchill's.

If poet Von Wolkenstein could revisit today the neighborhood of his family castle of Trostburg, where the Gardena flows into the Isarco, he would be considerably astonished. Beside the highroad a mighty Roman figure on a gigantic horse guards with outflung arm the entrance to the hydroelectric station.

Here the waters of the Isarco and its tributaries are harnessed and led for 10 miles to Cardano, near Bolzano, one of the largest power stations in Europe. The water power is transformed at Cardano into electric energy of 500 million kilowatt-hours yearly. Twenty-five million supply the Brenner railway; the [illegible] power [illegible] Bolzano industries.

Armies and Traders Have Toiled Through These Mountains Since the Dawn of History

[illegible]

[illegible]

"What Age Do You Give Me?"

"Where have you come from? Where are you going? How old are you?"

This last question is evidently [illegible] in Italy, for it is parried in most parts [illegible]

by the retort, "What age do you give me?"

The ticket collector very gallantly gave me some 30 years, and I told him that I came from Scotland and was walking (an obvious lie) to Venice.

He looked astonished.

"You are then apparently used to all this walking," he said. Then to my surprise he remarked, "But the people of Scotland like walking. I have spent six weeks in Glasgow."

"You have been in Glasgow? Then you no doubt saw Edinburgh also, and the Highlands?"

The ticket collector shook his head. "No, I was never out of Glasgow."

"You visited Scotland, and you were never out of Glasgow! Did you not even visit Loch Lomond?"

"No. It was wartime, you see, and I was a prisoner!"

It requires tact to travel in topsy-turvy Europe. But the unembarrassed collector got his own back presently when he rose to move on, and, producing his ticket book, remarked that he would have to charge me 200 lire for riding first class.

Sculptured Tree Trunks

When I arrived in the picturesque Valley of Gardena (Val Gardena), strange sights greeted me. St. Peter, grasping a large key, leaned in an abandoned attitude against a doorway. St. Anthony lay prostrate in the arm grip of a vise pressing the crown of his head to the soles of his feet. The Madonna would probably have smiled a blessing on both, but her smile was still in course of construction under the skilled gouge of a master craftsman.

Gardena is the home of wood sculptors. It is the only valley in Europe—perhaps the world—whose inhabitants turn tree trunks into effigies of saints and angels. They have been doing it for the past three centuries. It began when Christian Trebinger, born in 1580, started the industry by carving picture frames.

In other villages farther up the valley the carving of smaller objects, such as toys and animals, has centered for generations. In Ortisei sculptors make large works of a religious nature, and their carvings are exported to all the Christian world (page 393).

"Come in," said a sculptor hospitably, as I entered his studio. One of the large figures he was working on was destined for Chicago. The sweet, sharp scent of wood shavings filled the room. The trees grow high on the mountains, and the wood must mature for three or four years after felling.

Apprentices must also mature for the same period before they are proficient. They never set up alone until they have studied their difficult craft for at least 10 years.

Like the carving, the finishing is a matter of exquisite care, and the work is done by different artists in their own studios. A large figure may take three weeks to a month to paint.

"In the days before the world wars," said one artist wistfully, "there were studios in Gardena with 20 to 30 apprentices. This is now, of course, impossible, with taxation and living costs so high. Many boys who would gladly follow the old profession cannot find masters to train them."

Before returning, I went into the church to pay my respects to St. Ulrich, Ortisei's patron, a massive wooden figure with hand upraised in blessing. I was to see him to greater advantage when I returned six weeks later on his name day with National Geographic photographer Volkmar Wentzel.

St. Ulrich is carried in procession around the town, preceded by banners and followed by other saints from the church and a host of people from the Valley of Gardena, many of them in picturesque national costume (page 403). Every year the sight fills the town with visitors.

The *funivia*, a glassed-in elevator dangling from a slender cable, carried me to the heights of the Siusi Plateau, more than 2,000 feet above Ortisei. It is the fastest funivia in Europe, travelling over a mile in seven minutes. At the top, reaching an angle of 70°, I alighted thankfully at the summit platform.

Panorama of the Dolomites

An elderly Englishman stood with hands in pockets gazing at the vista of snow-capped Dolomites which ring the vast plateau.

"Incredible, isn't it?" he said.

Climbing along the ridge to a higher point, I found another elderly gentleman, an Italian this time, gazing at the breath-taking panorama which spread from the Sella buttresses to the 10,000-foot giants far behind the Austrian frontier (pages 340, 392).

My Innsbruck friend was correct when she said the Dolomites defied description—that they must be seen to be believed. Yet, apparently, surprisingly few people could afford to look at them at that moment. Owing, perhaps, to the high rate of exchange, I found Italian hotels in the Tyrol largely deserted.

"Such a picture," cried the forlorn Italian gentleman. "And yet I have been here alone for the last two hours. You are the first to come."

I was now about to scale the Sella Pass 7,264 feet high (page 404). The motor road was not open yet for the summer. I planned to spend the night in Plan, at the head of the valley, and take the footpath which climbed

Cloud-capped Tyrolese Alps Guard Innsbruck, Seen on Gateway to the Brenner Pass

A Lushly Bearded Bagpiper and Beaming Friend Display Mottel's Village Banner For a 170th Anniversary Celebration

[illegible] Dedicates Rose Stadium as Pirates on the Move

[illegible]

Corpus Christi Day Brings Out Valued Family Heirlooms

[illegible]

Santa's Helpmakers Turn to Carving Toys in Winter

[illegible]

A Lifetime of Carving Lends Sure Skill to Aged Fingers

[illegible]

Steady Pale Pioneers Use Tweed Home in Three Journeys

from there to the Alberga Rifugio of the CAI (Club Alpino Italiano) near the summit.

On my way up the valley to Plan I was joined by a pretty young native girl, the daughter of a sacristan at one of the churches. She chatted to me in Italian, but exchanged greetings in the old Ladin tongue with passers-by. In the Valley of Gardena the charming *Grüezi Gott* of the Tyrol becomes the Ladin *Buon dì* (good-day).

My companion walked fast. "Let's hurry," she said, "or we may be late for the market. You are going to the market at Santa Cristina?"

A market! Here was a bit of luck. Of course I was going to it.

"It's a fine thing to be free to travel like you," said my friend. "I would also like to do that. Can I come to see you in England and we might travel together?"

"What would your parents say?" I asked a little dubiously. "I expect they want you to marry and settle down."

"Ah! I do not want to marry. Men are [illegible]."

She fanned her scarlet jacket. "How hot it is! Aren't you thirsty? When we reach the fair, we'll go to the inn and drink wine."

"This Little Pig . . ."

We found Santa Cristina in an uproar. Stalls of merchandise occupied both sides of the road, and traffic was at a standstill. Bianca pushed masterfully through the throng to the inn. Room was made for us at the top of a crowded table, and she ordered wine.

We drank a second glass. But when Bianca suggested a third, I thought of her sacristan father and proposed orange juice instead. She meekly agreed.

"It is not proper," she added primly, "for women to drink too much wine."

I paid the bill and we returned to the fair. A young man in white stockings, Tyrolese dress, and a carnation at the back of his hat caught sight of us and came up. For a spinster of such decided views, Bianca seemed eager to exchange my company for his.

I went off alone to watch a small pig being haggled for. Eventually he changed hands at 8,500 lire (about $11.21).

I did not stop long at Selva, the next village, but went on to Plan. Here I had meant to rise before the sun, for the first few miles over Sella Pass would be a grueling pull-up with all my luggage to carry. But the day I had picked for my crossing was Corpus Christi, one of the greatest church festivals of the year. It was unthinkable to start without seeing the procession.

The church was thronged. The priest himself led me to a foremost pew, where I sat, an incongruous figure beside matrons in tall black caps and blue gowns with lace aprons and silver ornaments. Across the aisle were young women in brilliant lace-covered dresses and high golden tiaras (page 391).

Bandsmen filled the aisle, playing a merry dance tune as they entered. "Wilhelm von Wolkenstein, 1503" is fresco'ed over the doorway of Selva's old church. Looking around, I felt I might have seen Wilhelm behind me in his pew, so little had time changed the picture in this peaceful glen.

Service over, the procession formed in the sunshine outside. All the saints in the church took part in it, carried on their heavy wooden platforms by helmeted firemen. In the midst walked the priest in magnificent robes under a canopy upheld by perspiring elders.

The villagers fell in behind this colorful pageant, and with the music of the band floating out over the mountains, the procession passed slowly around the meadow and down the road, where all cars had been halted. It paused twice by decorated altars for brief services.

A woman at the rear of the crowd turned to me. "Will you walk with me?" she asked.

And so, preceded by the saints and the bandsmen playing a solemn measure, I took my place in the procession before setting out to cross Sella Pass.

Up, Up, Up to Five-finger Peak

The mountain was awakening from its winter sleep. I left the woods and came to the snow. Where it had melted, the wet ground was bright with pale crocuses. Above me, under the massive towers of the Sella, workmen were clearing the road from the debris brought down by winter avalanches.

As I watched, the first motorcar of the year crept cautiously past. Soon it would be followed by innumerable others, including crowded buses from much of Europe.

The roads through the Italian Dolomites are triumphs of engineering skill. They skirt terrifying precipices and climb by hairpin bends and loops to the steepest watersheds.

Giant and naked out of the green meadows towered Langkofel (Sasso Lungo), the Five-finger Peak, and Grohmann Peak.

The Five-finger Peak is supposed to resemble the fingers of an open hand. It is one of the most difficult climbs in the Dolomites and will always be associated with the name of L. Norman-Neruda, who scaled it six times and met his death on it in 1898. He and his guide were the first to discover the route up the north side in 1891, though the mountain had already been climbed from the south in 1890 by Robert Hans Schmidt and Johann Santner.

They Make Mountain Music on a Tyrolese Holiday

[illegible]

[illegible] near the summit of the [illegible] we [illegible] a group of [illegible] who were [illegible] two weeks [illegible] [illegible] of them put me on [illegible] Canada warning me to "keep [illegible] the wind."

[illegible] downhill, sending the [illegible] in 1944. [illegible] airmen lost their lives when their [illegible] When Mr. We[illegible] and I [illegible] a month later we [illegible] some sunburned [illegible] that there was [illegible] place, Italians [illegible]

[illegible] the [illegible] Mountains, [illegible] [illegible] "[illegible] day at the Ameller. The following morning I [illegible] with the church bell at 5 to reach [illegible] the sun got high. The Valley of [illegible] [illegible] Mountains [illegible] the [illegible] the [illegible]

Poetry and Cowbells at Predazzo

[illegible] Predazzo [illegible] I had never seen [illegible] in collars and bells. There were [illegible] of them, belonging to nearly [illegible] many different owners. For six months they

[illegible]

So That's the Kind of Costume They Wear in India!

[illegible]

[illegible]

Love—and English—Conquer All

[illegible]

Reflected Light Makes Venice's Piazza di San Marco Seem Covered with Water

Its pavement of marble and trachyte helps produce the illusion. [illegible]

[illegible] Mr. Bartlett, [illegible] of the Grenadier Guards, who had been [illegible] in Venetian [illegible] and been wounded on the Marne. He [illegible] Second [illegible] to Venice.

During the war he had been English [illegible] to Milan [illegible] and was [illegible] to a particular [illegible] Alexander [illegible] to be [illegible] soldiers and [illegible] the French [illegible] weather in Venice which [illegible] them to [illegible] from [illegible] against [illegible] the enemy.

"Most [illegible]," said Mr. Bartlett, [illegible] "I was [illegible] of the time. One of the [illegible] I helped was in 1916 when the US troops were here. One night we heard a [illegible] to tell me he had [illegible] [illegible] not be [illegible] to see them.

"[illegible] I [illegible] here. But [illegible] At that time the Germans were [illegible] 5,000 [illegible] [illegible] such numbers.

"[illegible] Mr. Bartlett and [illegible] had [illegible] Venetian [illegible] to their home [illegible] deep in the [illegible] Venice [illegible] for [illegible] They made a sketch [illegible] [illegible] He [illegible] Venice [illegible] for [illegible] and the [illegible] girl [illegible] had been waiting for him.

With Fireworks, Venice Celebrates Deliverance from a Plague in 1577

[illegible]

[illegible]

Neptunian Landscape

[illegible]

gazing upon a landscape in the planet Neptune. But thrushes were fluting, and I heard again the rare note of a cuckoo.

A little higher than the telegraph poles dangled the empty chairs of the *seggiovia*, the chair lift which carries the brave to the head of the pass. It was not working or I might have been tempted to try it. On my return journey some weeks later I sampled a seggiovia at Chiesel. It is not everybody's armchair, but it is a pleasant mode of travel for the level-headed.

A chain or iron rod is all that holds the sitter from the gulf as he dangles from a slender cable. Slipping along at the height of the treetops, he can peep into birds' nests in passing. It is less pleasant to look down and find oneself crossing a foaming river hundreds of feet below.

Poor St. Martin! About a century ago his hospice was a quiet hermitage in a remote glen, approached by a mule track. Today the little church is completely dwarfed by majestic hotels, for San Martino is a favorite tourist resort in winter and summer, and a modern highway runs through it.

I avoided the road next morning, taking instead the bridle trail to Fiera di Primiero. It led me through flowery meadows decked with bright-orange heads of Tiger Lilies.

At the open door of a cottage I peeped in. One of San Martino's three remaining cheese makers was at work combing the stiffening curd in a huge copper cauldron with an immense rake. After the liquid had been reheated, he explained, the curd would settle to the bottom. Then he would get four stout 10-pound cheeses out of it, which he could sell in the neighborhood at the modest price of about 200 lire (32 cents) per pound (40¢).

An Italian from Texas Spoke French

Leaving the cheese maker to his work, I sought the grateful shade of the forest. Far below I heard the noise of the Cismon River, and under the pines I rejoiced to meet an old friend, the single-flowered peony. The last time I had knelt to smell one of this group, I remembered, was in Kodiak, Alaska.

Crossing a bridge over the Cismon, I came at last to the highroad and the village of Siror, on the outskirts of Primiero. Here a sudden thundershower caught me, and I took shelter in a roadside café. The bartender was a gray-haired man who had lived in Texas and spoke to me at first in French.

"You are going to Venice?" he asked. "This man will take you there."

He indicated a bus driver in yellow overalls who had just come in. It was quite true. His bus went from Primiero to Venice in some six hours by way of Feltre and Cornuda.

"Cornuda?" My eyes brightened. Time was wearing short, for I had a date to keep with Mr. Wentzel and his car—not at Venice, for that happy city is still immune from tires.

But at Browning's village of Asolo, on a hill above the Venetian plain eight miles from Cornuda. The rain was still pouring down.

"Can he take me to Cornuda?" I asked.

"You bet he can," said the man from Texas.

The bus did not leave till 3 o'clock. I had two hours to visit the fine old market town of Primiero, which deserves better treatment. Like Predazzo (page 397), it stands near the junction of three valleys.

The bus route led down the Cismon. Like many rivers on my way, it had been harnessed for Italy's hydroelectric schemes. Not far from the old Austrian boundary at Monte Croce it dammed into a green lake.

Steep, dark, and narrow was the defile through which our driver, with skillful hands and scarcely slackened speed, now hurled his bus. We passed towering crags on the left and a grim precipice with the river at the bottom on the right.

I wished too late I had kept to my feet, and sympathized with a white-faced little boy, blubbering with terror at sight of the abyss. At the worst turn workmen were mending the road, and not even the usual short cement pillars protected us.

"You must trust the driver," shouted that individual genially, turning around at this awkward bend to comfort the little fellow. A notice over his head strictly forbade smoking or talking to the man at the wheel, but a friend who had come on at Primiero leaned familiarly over the back of his seat chatting. Both were smoking.

At last we came out of the grim valley into a wide and beautiful plain surrounding Fonzaso and Feltre. Here were vineyards, fields of golden grain ready for the reaper, chestnuts, and mulberries.

Keats, Browning, and Asolo

Near historic Feltre we turned down the valley of the wide Piave, whose turquoise waters spill between steep heights onto the plain and join the Adriatic northeast of Venice.

Cornuda is a pleasant town with tree-lined streets where inhabitants are largely engaged in shoemaking. I was the sole passenger to alight. I asked my way to an inn. It was neat, primitive, and covered with wisteria-bloom with supper included scarcely cost the price of a cup of tea in more sophisticated Italy.

The inn stood at a crossroad, and I was kept awake by the strident horns of every passing car. But another note presently made itself heard above the din. Higher and higher

Crowded Boats Almost Fill the Grand Canal on Venice's Gala Regatta Day

[illegible]

it poured, wilder and more passionate than all—"Jug-jug-jug-churra-churra!" It was the nightingale, bringing thoughts of poetry, of Keats and Browning, and of Asolo!

Browning's burly shadow still falls gratefully over the lovely hilltown, scene of *Pippa Passes*, where worked the little orphan silk weaver. Here he wrote parts of *Asolando*, his last volume of poems. Those who care may still finger in the town museum the brown keys of the spinet to which he sang Russian and French songs for his American friend, Mrs. Arthur Bronson.

The school of embroidery founded by his son still flourishes. Dispersed after the son's death, it was reassembled by other lovers of the old art. In a bright workroom overlooking the plain, delicate-fingered girls turn out copies of old Italian designs on tablecloths, cushions, and napery. So exquisite is this workmanship that it is hard to tell front from back (page 407).

There is a school of silk weaving in Asolo also, now owned by Miss Freya Stark, noted British explorer of Iran, Arabia, and the Hadhramaut, and another lover of Asolo. Here the product of the silkworm is dyed all manner of delicate shades and exported to far corners of the world.

Apart from such activities, Asolo is still the dream town it was in the days of Caterina Cornaro, widowed Queen of Cyprus. She retired, on her forced abdication in 1489, to the tower which still dominates the square, signing herself "Queen of Cyprus, and Armenia, Jerusalem, and Lady of Asolo."

"There," writes one of her historians, "she lived, dispensing justice, founding a pawnshop for the assistance of the poor, distributing free corn in years of distress, listening to the courtly conversation of Cardinal Bembo, and amusing herself in the gardens of her summer-house in the plain."

In the Hotel Belvedere I occupied a huge stone-flagged apartment with four windows. From these I could see the high tower of Caterina's castle and the house rebuilt by Browning's son. Below lies the flat country, washing up to the height on which the town stands like the blue waves of a slightly ruffled sea. White steeples rise here and there like the masts of ships. On clear evenings the hills beyond Padua (Padova) look like mist-encircled islands. To the left, still invisible behind her waters, is Venice.

"You Cross the Sea to Come Here"

The hill path to Venice climbed up and down past vineyards and little farms. Flowers bordered my path; walnut trees and hazels thick with green fruit hung above. I asked directions from a woman in a farm cart which two stout oxen slowly dragged up the lane. They halted of their own accord to rest.

"They are old and tired," she explained. "They have been working hard all day. You are from Asolo?"

"I come from Scotland."

"Scotland? Where is that?"

"Well, it is near England."

"Ah, then you had to cross the sea to come here, like Eleonora Duse. Have you seen her tomb in the cemetery? They brought her back in a ship from America to lie in the place she had chosen at Asolo. I knew her well. She always dressed in white. For eight years I was a weaver, and she was very much interested in the weavers. We all received a special card to her funeral. Ah! What a funeral!

"No, I have no time now for weaving. Six children and all the drinking water to be carried from the bottom of the lane. And I have nothing to offer you, for last year's wine is done now. Unless you would like some cherries? My daughter will knock some down for you."

Before I could protest, a barefoot child leaped nimbly into the branches and with magnificent hospitality knocked the last of luscious black fruit onto the grass. Yet these people were so poor that their children had never seen Venice, a mere 20 miles away.

Venice—Good-bye to Automobiles

As I munched my cherries, I remembered my own first arrival in Venice on a moonlit night many years ago, sailing from the railway steps in a gondola. Could such an experience be repeated?

A causeway, completed in 1933, now leads all traffic over a dam into the city. I crossed it in a bus and ended up in the most up-to-date garage in Italy. The large building contained everything that a car or its driver could possibly want. But when the motorist leaves this garage, he says good-bye to cars all the while he is in Venice. It would still be perfectly possible to live in the city and never set eyes on one.

Though motorboats and steamers hurry up and down the Grand Canal and gondolas are fewer, I knew instinctively that Venice had not really changed, that she would probably never change (pages 399, 401, 408, 409).

A steamer landed me with my rucksack at the Piazza di San Marco (pages 398, 400). Fascinated, I watched the Moors beat out the eternal hour from the clock tower beside St. Mark's. And they were still feeding the pigeons in the Square! I pushed my way eagerly through the crowd to buy a bag of grain from the very same old man in the very same old straw hat.

I had reached Venice!

Snow and Avalanches from the Sierras Block Self Pass Except in Summer

Celebrating the Feast of the Assistation, Predazzo Honors Its Madonna

[illegible]

"Hot Dog Stand" Frontier Style, Offers Sausage, Dry Bread, and Refreshing Lemonade

[illegible]

Serving Needle Inspection The Tower Stands at Assisi

[illegible]

Working Cheese The Ramparts the Grand Balcony Be Seen By Needles

[illegible]

[illegible] Author Fakes Wacky Dream Gig

[illegible]

[illegible]

[illegible]

[illegible]

Six Centuries of History Look Down on the U. S. S. Jacob Jones Anchored in Venice

[illegible]

Folger: Biggest Little Library in the World

By Joseph T. Foster

Illustrations by National Geographic Photographers B. Anthony Stewart and John E. Fletcher

THE WORLD'S largest and finest collection of Shakespeareana doesn't lie in Stratford on Avon, in London, or even in Great Britain. It is housed at the Folger Shakespeare Library, Washington, D. C.

The library has become an outstanding research institution, where almost any significant topic in the history of English civilization in the 16th and 17th centuries can be studied. It is known far and wide as a dynamic center of learning in the English-speaking world.

Last year scholars from 34 States and nine foreign countries used its resources. And more than 60,000 sight-seeing visitors passed through its exhibition hall to see rare documents, musical instruments, paintings, costumes, and mementos on display.

Because of the imagination and foresight of the trustees of Amherst College, Amherst, Massachusetts, who have administered it since its beginning, the library has prospered and grown.

More than a Shrine to Shakespeare

Though it is called Folger Shakespeare Library, it is not, as most persons think, devoted only to the Bard, nor is it only a monument to a great poet.

The Folger includes the Western Hemi- [illegible] more study of English civilization before 1641. In fact, it claims more than 55 percent of the titles of all existing books printed in England or in English before that time.

The library hopes in time to procure, in some form, every significant English book published from the invention of printing to the end of the 17th century. The library tries first to get early editions. If originals are not available, it obtains a book in microfilm or photostat.

The 17th century is particularly important for Americans because colonial America was directly descended from the culture of England in the 16th and 17th centuries.*

The library also possesses a surprising amount of early Americana, including rare volumes describing voyages and explorations in the New World, and such books as Capt. John Smith's *Generall Historie of Virginia, New-England, and the Summer Isles.*

Because of this wealth of collateral Renaissance material, scholars do not have to study Shakespeare in a vacuum.

It is no wonder scholars look to the Folger as "the best and finest Shakespeare collection" and refer to it as "the biggest little library in the world."

The history of the Folger and the man who founded it reads like a success story in the best American tradition. In 1879 Henry Clay Folger, a poor senior at Amherst College, bought a 25-cent lecture ticket to hear Ralph Waldo Emerson. The New England philosopher inspired the student with his beautiful English and fine intellect.†

"Orbit and Sum of Shakespeare's Wit"

Later the young man stumbled on an excerpt from a speech Emerson made in Boston in 1864, the tercentenary of Shakespeare's birth. It read:

> England's statue filled a measure
> Of heart and soul, of strength and pleasure.
> Gave to the mind its Empyrean
> And he was larger than human:
> Not superior genius could but
> Orbit and sum of Shakespeare's wit.
> The men who lived with him forgave
> Poets, for the air was [illegible]

The eulogy so fired Folger's imagination that he began a thorough study of the poet's works. He left Amherst with a great love for Shakespeare.

After graduation, he took a clerk's job with a New York oil-refining company and studied law in his spare time. He was admitted to the bar in 1881, but chose to stay with the rapidly expanding petroleum industry. It was a wise choice. He rose to be president and later chairman of the board of the Standard Oil Company of New York.

Folger never lost his interest in Shakespeare. Shortly after his marriage to Emily Jordan in 1885, he purchased for $1.25 a reduced facsimile of the First Folio. "Here you may see Shakespeare's plays as they were actually presented to the world," he told his wife. Mrs. Folger named that volume "the cornerstone of the Shakespeare Library."

He bought his first rare book, a copy of the Fourth Folio, at auction in 1889. He got it for $107.50 and had to arrange for credit to pay for it.

Later Henry Folger became a millionaire

* See, in the NATIONAL GEOGRAPHIC MAGAZINE, "The British Way," April, 1949, and "Founders of Virginia," April, 1946, both by Sir Evelyn Wrench.

† See "Literary Landmarks of Massachusetts," by William H. Nicholas, NATIONAL GEOGRAPHIC MAGAZINE, March, 1950.

Folger's Gleaming, Marble Purchase a Matchless Treasure of 16th-century Lore

[illegible]

At a time when many Americans [illegible] were collecting rare books and [illegible] set about finding Shakespeare's [illegible] [illegible] in the [illegible] of [illegible] [illegible]

[illegible]

[illegible] Shakespeare [illegible] to get [illegible] Then Folger's [illegible] and the [illegible] known to the world.

British newspapers [illegible] against this American millionaire who carried off precious [illegible] Hitler's [illegible] [illegible] Nevils [illegible] [illegible] collectors [illegible] [illegible]

The Royal Tudor Dimmentionable

[illegible]

I got tired of your [illegible] Henry [illegible] I [illegible] Lizzie [illegible]

[illegible]

Mrs. [illegible] grew into one of the greatest in America, [illegible] [illegible] Mrs. Folger [illegible] [illegible]

The [illegible] [illegible]

Under a Bust of the Bard, the Director Looks Over New Folger Acquisitions

[illegible] the Library has promoted and [illegible]

Stratford-on-Avon. He refused. His ambition, he wrote in a letter of January 19, [illegible] was "to make the United States a center [illegible]

Later that same year, he [illegible] that the world's largest library, the National Library of Congress, [illegible] Washington because he felt that it would inevitably become a great research center one day, so that [illegible] to the Library of Congress would be [illegible] to scholars."

He had already purchased the site, adjoining the Library of Congress, and approved plans for a 21-story-and-[illegible]-story building.

The [illegible] contract was secured for the James Baird Company, Washington and New York, by Thomas W. McKnew, then [illegible] president of the Baird firm and now [illegible] of the National Geographic Society.

Later Mr. McKnew [illegible] tion of the National Geographic Society's main building in Washington.

To design the library, Mr. Folger selected the late Paul Philippe Cret, one of the most distinguished names in contemporary American architecture.

A Bit of England on Capitol Hill

The cornerstone of the Folger Library was laid May 28, [illegible]. Two weeks later Henry Clay Folger died, never having seen his collection as a whole. It was [illegible] more than 2,000 [illegible] cases. Yet his [illegible] were to achieve the [illegible] of a lasting memorial to the Bard and [illegible] accumulation of a kind that the world has never seen.

This will left the library to the American people and endowed it with adequate funds [illegible]. Its administration has been placed in the hands of three trustees [illegible]

* See [illegible] "The National Library," May [illegible] and "[illegible]," May [illegible] by Allen W. Atwood.

Bas-reliefs on the Folger Façade, Sculptured by John Gregory, Portray Famous Scenes from Shakespeare's Plays

Zone of Quiet: Folger Reading Room Is for Scholars Only

[illegible]

Into This Globe Theater Went 2,917 Pieces and 10 Years of Work

[illegible]

[illegible]

[illegible]

[illegible]

On an Elizabeth Stage, Romeo and Juliet Speak Deathless Lines

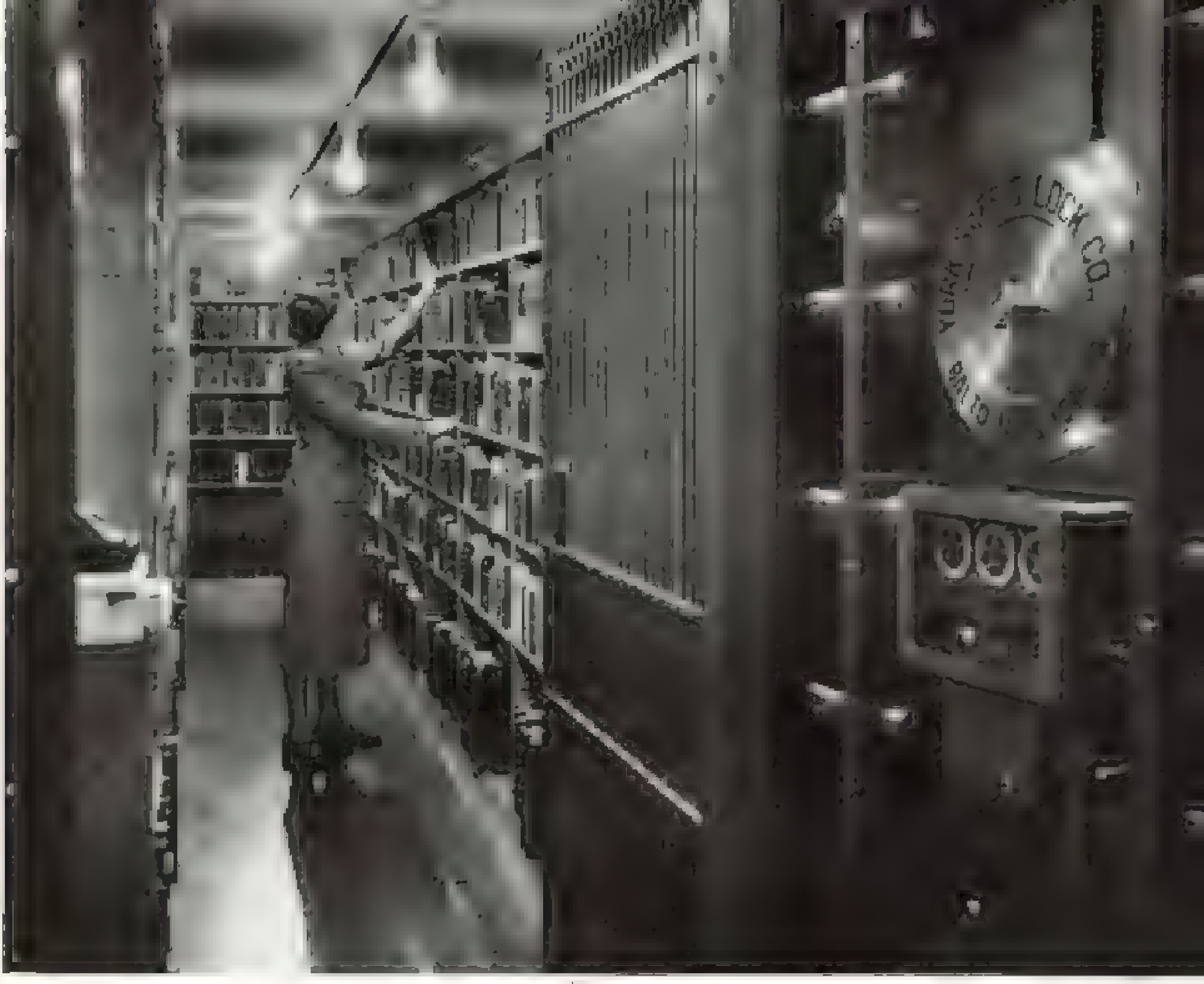
[illegible]

Folger's Binder Specializes in Matching Centuries-old Book Covers

[illegible]

[illegible]

[illegible]



The Library Guards Its Priceless Rare Volumes Like Gold—in Special Bank Vaults

[illegible]

In the [illegible] a [illegible] because there are no regulation [illegible] [illegible] would have [illegible] the hearts of the [illegible] ages.

Exceptions [illegible]. In March and April, [illegible], the Amherst College Masquers presented [illegible] in the true Elizabethan [illegible] and the [illegible]. The play was presented [illegible] times, with great success [illegible] throughout the East and Midwest.

Emerson Lines Carved over Fireplace

The great two-story reading room resembles a [illegible] hall of a Tudor [illegible]. Despite its massive size, [illegible] feet [illegible], it [illegible] the character of a private library (page 315).

[illegible] over the fireplace in this room [illegible] Mr. Folger [illegible] carved the lines from [illegible] of Emerson.

At first the [illegible] glass doors [illegible] the [illegible] open. Readers complained they were disturbed by visitors peering at and [illegible]. So the doors were closed.

But readers still [illegible] that [illegible] were [illegible]. One [illegible] up a sign, "Please do not feed the readers." [illegible] The doors are now [illegible].

The first [illegible] the vast amount of material in the Folger Library is its wide variety. There are books, [illegible], manuscripts, [illegible] paintings, drawings, [illegible] statues, [illegible] furniture, tapestries, [illegible], playbills, [illegible] prints, [illegible] relating to Elizabethan [illegible] Shakespeare and his time.

Of the First Folio (first collected edition of Shakespeare's plays, 1623), the library has 79 of the some 240 copies now known to exist. Its nearest competitor, the British Museum, has five copies.

No Price Tag Could Possibly Be Placed on the So Rare Books and Documents on This Table

Has Project Gutenberg Eight Volumes, Three Other Scholars, and 50 Years of Research

[illegible]

The Bard's Only Offspring

[illegible]

Sir John Harington's invention, an early version of the flush toilet, in *An Anatomie of the Metamorphosed Ajax* (1596).

Folger collected everything from the much-publicized corset of Good Queen Bess to furniture and wooden objects made from the mulberry tree in Shakespeare's garden.

Of such things, the Library's director, Dr. Louis B. Wright, candidly says he believes "the corset's a fake"; and "there's enough wood here for two mulberry trees."

"I'm William Shakespeare"

One day after work, Wright was getting into his car when a man with a rich cockney accent came up to him. The man asked to see the Library.

Dr. Wright explained the Library was closed for the day, but if the man came back the next morning, he'd be happy to show him around.

"I'm very interested in this library," the man said. "You see, I'm William Shakespeare." Wright's eyes popped. It appeared that the man was an indirect descendant of Shakespeare.

When the director recounted the incident the next day at the office, one staff member remarked, "If Henry Clay Folger were alive, he'd have the man stuffed and put in the library!"

The greatest single addition to the Folger was the acquisition in 1938 of Sir Leicester Harmsworth's Renaissance library. The Folger wanted the collection badly and considers itself most fortunate in acquiring it.

Much of this good luck was due to a young Englishwoman who came to the library in 1936 on a regular Washington sight-seeing tour. She asked the guide to obtain permission for her to enter the reading room. A staff official was only obliged.

Just before she left, he learned she was a Miss Harmsworth. He asked if she was any relation to Sir Leicester Harmsworth, the book collector. She was his daughter, and pleased to know that the staffman knew of her father.

On her return to England, she told her family of the Folger and how much impressed she was by the attentive care given rare books and manuscripts.

When the Folger began negotiations to buy the collection after Sir Leicester's death, the trustees of his estate remembered his daughter's impressions of her visit and were favorably disposed toward the Folger Library. The family was further induced by the Library's offer to put in each volume a name plate reading, "From the Library of Sir E. Leicester Harmsworth, Baronet."

The collection is supposed to have cost Harmsworth more than two million dollars. It was sold to the Folger for less than one-tenth of its original cost because Lady Harmsworth wanted it placed in the Folger, where it could serve as a nucleus of a research library in English history.

Sir Leicester did not collect Shakespeare and drama. But in nearly every other phase of Elizabethan culture—history, exploration, theology, music, poetry, and printing—his library was remarkably rich.

The purchase of it by the Folger brought [illegible] shrine to the Western World's most valuable historical library on English civilization of the 16th and early 17th centuries.

Actually, only one institution in the world now outranks the Folger in this field—the British Museum. The Bodleian Library at Oxford and the Huntington Library in California are close runners-up.

The Library recently received an extraordinary shipment of books, which it purchased in London at the sale of the Shipdham Church library, a parish church in Norwich.

Most of the books, all 17th-century titles, apparently had remained unopened since that time. Some of their pages were uncut and were as bright inside as on the day they were printed, though stained and soiled on the outside from the dust and damp of 300 years.

Old Books for New Roof

The catalogue advertising the sale explained the church's decision to sell the old library: "It may be added that the sum realized will be used to meet the heavy expense of repairs to the roof and the additional cost of £175 for new heating apparatus—both of which are of great urgency at the present time."

The Folger was glad to help provide for the comfort of the good parishioners, but even more pleased to get the fine books.

Though the staff is quick to claim the library is no ivory tower, persons who wish to carry on research there must have proper identification and proof that their work can best be done at Folger.

It was once generally believed that to get into the Folger you had to have a Ph.D. This is not true, though most readers do have that degree.

The Library does not encourage students who could find references elsewhere. These are politely but quickly shooed across the street to the Library of Congress.

Louis B. (for Booker appropriately enough) Wright came on from Huntington Library, San Marino, California, in 1948 to take the Folger reins. The South Carolinian spends

It's a Tight Squeeze to Struggle into Queen Elizabeth's 28-inch-waistline Corset

[illegible] a most publicized claim to an undergarment bought by Henry Ford in [illegible] Queen Bess (page 412). However, director James B. Wright says he [illegible] These [illegible] sets of lace stays covered in cloth and edged with red leather. Here catalogued [illegible]

good bit of his time geeking worthy students for the 12 to 15 annual Folger fellowships and grants [illegible]

Periodically, Dr. Wright writes a lively [illegible] newsletter that goes out to former readers and other interested parties. He has been highly complimented on his knack for handling news and events at the library with such [illegible] ease.

He was understandably proud of a letter he received recently from Wilhelm Munthe, Director of the National Library of Norway and author of *Lovsang til Litteraturen* [illegible] *European Art*.

"Fountain of Knowledge of the Folger"

Dr. Munthe wrote, "Let me tell you how much I enjoyed your New Year's report. It [illegible] our duty for us librarians to peruse [illegible] reports. So, great is the joy to come across one which can be read with pleasure and a smile. Your report proves that information [illegible] can be given in a dusty and impersonal [illegible]. But the Capitol [illegible] Library of Congress be [illegible] between [illegible] the Folger.

These days in Folger [illegible] scholars [illegible] people [illegible] Shakespeare [illegible]

Most perennial [illegible] of the Folger [illegible] traveling group also [illegible] William Shakespeare [illegible] at all but that sir Francis Bacon [illegible] these Baconians are well [illegible]

[illegible] a middle-aged woman [illegible] in half screaming "Tear down this building!" It is a monument to a lie.

She was finally calmed down and shown to the door. The director urged her to go home [illegible] never heard from again.

One aging academician bored the staff another day by stating he had finally [illegible] King Edward VI [illegible] written the most [illegible] Shakespeare [illegible] spectator. The staff [illegible] at the [illegible]

"In Sweet Music Is Such Art, Killing Care and Grief of Heart" Wrote Shakespeare

[illegible]

into retirement and produced these classic [illegible] pieces.

The Folger [illegible] stand in the [illegible] controversy on authorship [illegible] Bacon [illegible] evidence.

[illegible] books and [illegible]

[illegible] attorney, came to the library armed with Oxfordian reports from New York papers. [illegible] listened to what Dr. James B. McManaway, consultant in literature and bibliography, had to say.

"Can you," he asked, "in 10 minutes show [illegible] that substantiate the Stratford [illegible]?"

[illegible] he announced he was [illegible] 100 percent.

The Folger [illegible] Will Shakespeare [illegible] all over the world.

A South African [illegible] for the library [illegible] A British [illegible] German [illegible] Folger to help [illegible].

Shakespeare in Pidgin English

A GI in the Pacific in World War II [illegible] English. [illegible] Please tell [illegible]

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[illegible] Society publishes the National Geographic Magazine monthly. All [illegible] are [illegible] the Magazine [illegible]

Articles and photographs [illegible] The Magazine [illegible] continually being [illegible] years of field work to achieve [illegible]

The [illegible] expeditions have proved back [illegible] the southwestern [illegible] economical dwellings in that region. The Society's research added secrets that had [illegible] three hundred years.

To Mexico. The Society and the Smithsonian Institution [illegible] discovered the [illegible] which we have [illegible] pictures in motion [illegible] Correlation [illegible] America [illegible] great center of early American [illegible]

[illegible] in a flight sponsored jointly by the Na[illegible] Society and the U. S. Army Air Forces. The world [illegible] provided by the [illegible] of [illegible] Lieut. Albert W. Stevens [illegible] and Orvil A. Anderson took about [illegible] photographs [illegible] scientific instruments, and [illegible] of extraordinary value.

[illegible] of astronomy was launched in [illegible] Solar [illegible] the [illegible] of the [illegible] photographs the [illegible] the great sky atlas for observatories all over the world.

In 1938 The Society sent out seven expeditions to study the effects of the [illegible] on the arts from [illegible] The trail [illegible] helped back geologic surveys of North America and Asia.

The [illegible] $75,000 and an additional $[illegible] were [illegible] for the [illegible] of the [illegible] Second National Geographic [illegible]

One of the world's [illegible] and [illegible] was discovered in Mexico and [illegible] Washington will be [illegible] by The Society and the Harvard [illegible]

[illegible] International Copyright [illegible] All rights reserved. [illegible] Entered at the Post [illegible] [illegible] Thirty-[illegible] [illegible] Editions, [illegible]

PIERCING THE UNKNOWN

This IBM electronic tube assembly [illegible] through the unknown [illegible] set the capsule [illegible] the [illegible] gases.

[illegible] produces the mysterious [illegible] particles [illegible] Some flutter of [illegible] and [illegible] particles right through a [illegible] system. Complex transformations of guided missiles, pilots into outer space, or [illegible] the unknowable.

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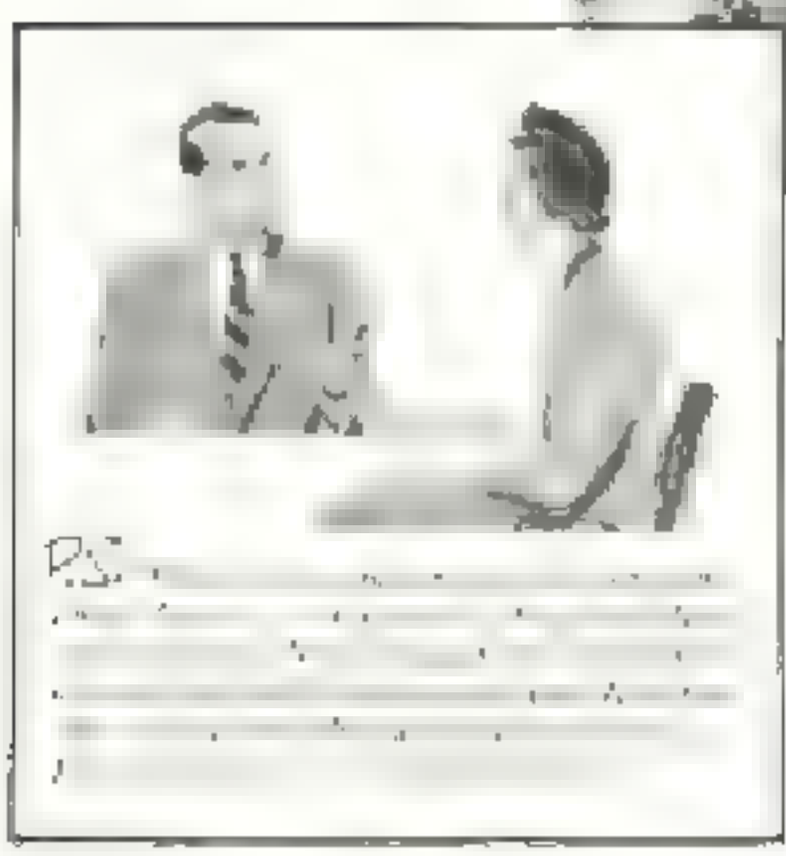

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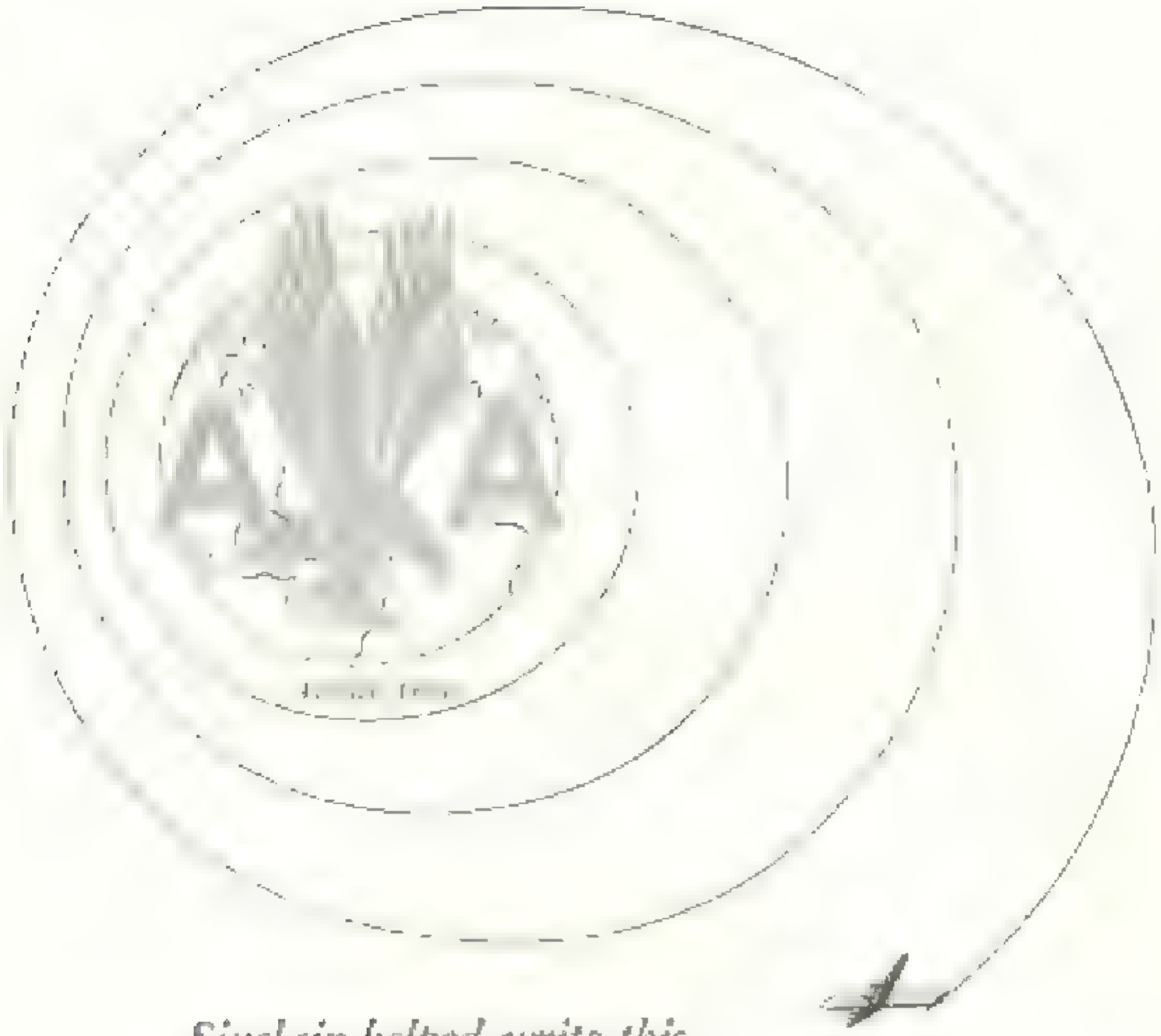

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Strange as it may seem, this new kind of glass—Pyrex brand infrared reflecting E-C glass—was originally developed to produce heat. The film bonded to the glass conducts electricity and when current is applied through electrodes, the glass becomes a heating element for a variety of industrial drying applications.

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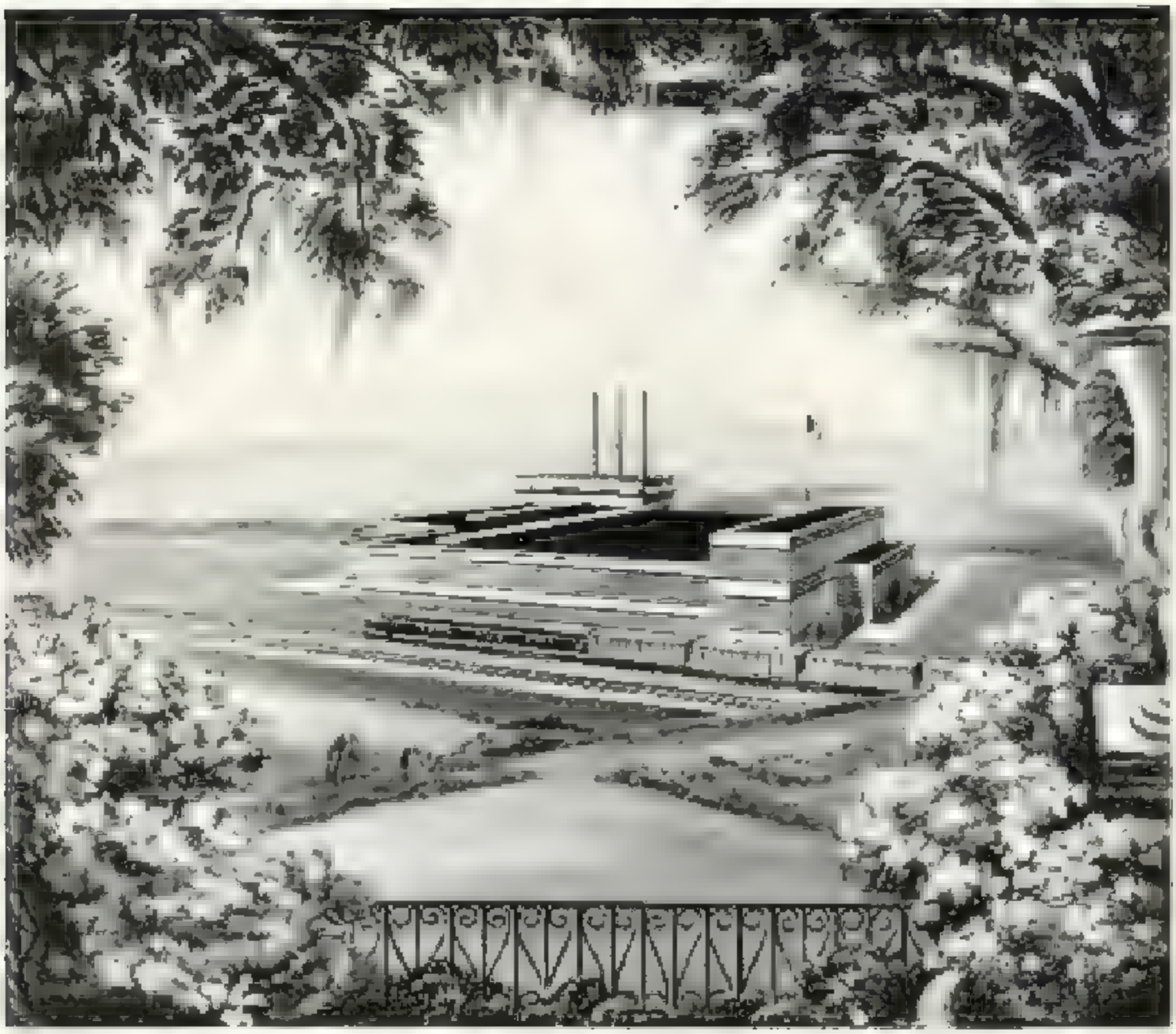

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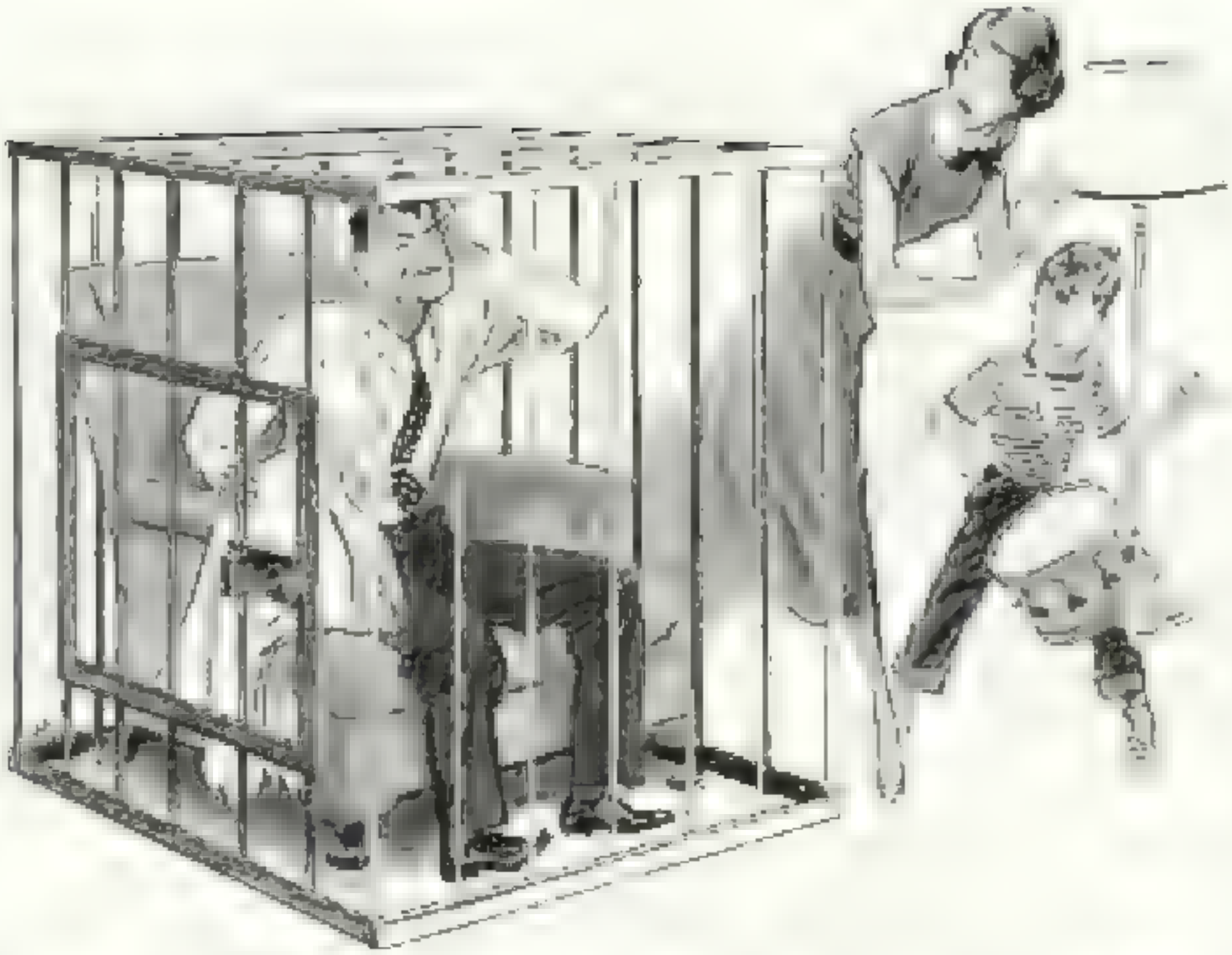
[illegible]

[illegible] TIME-MASTER [illegible] Write for your free copy of Dictaphone's new booklet "Time Is [illegible]." Write Dictaphone Corporation, Dept. H-91, 120 Lexington Avenue, New York 17, N. Y.

DICTAPHONE CORPORATION

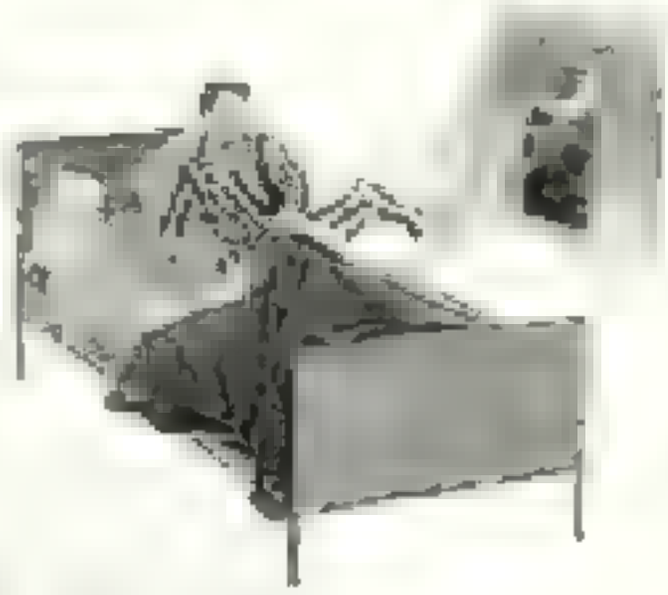
GREATEST NAME IN DICTATION

[illegible]



Does coffee bring out the beast in you?

1. A man can be cross as a bear when he is affected by the caffeine in regular coffee. [illegible]



2. He's an easy prey, at night, to every disturbing sound. [illegible]

3. Sanka Coffee hath charms [illegible]

4. Brings you back alive! [illegible]

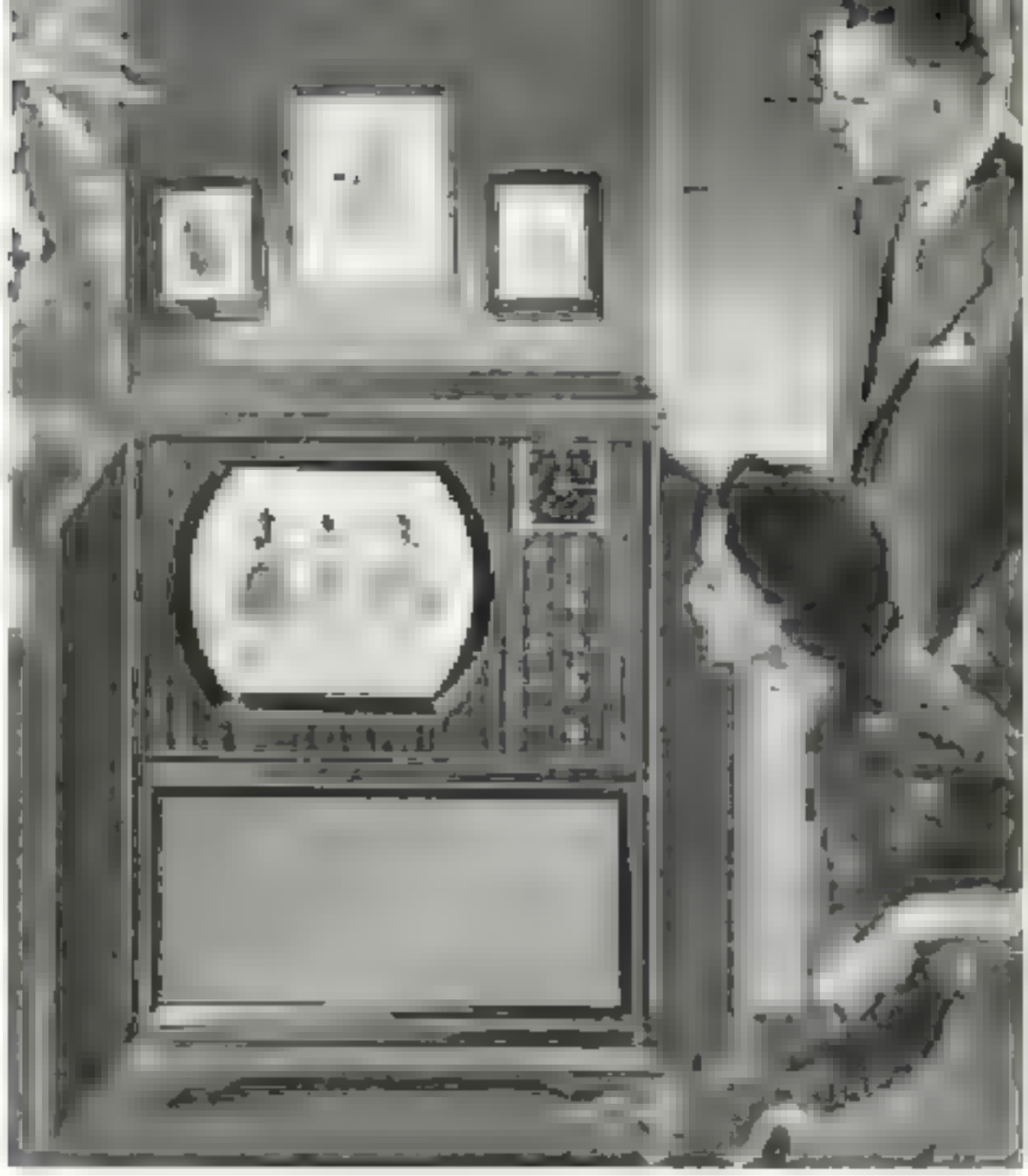
Product of General Foods

Sanka Coffee

Delicious coffee—and it lets you sleep!

[illegible] economical instant form. A jar of Instant Sanka makes almost as many cups as a pound [illegible]. And [illegible]

Instant Sanka is the only instant coffee that's caffein-free!



Everybody

enjoys television in the two set home

...and enjoys it more with *Du Mont*

Think of the advantages enjoyed by the two-set TV home — freedom for young and old to enjoy favorite programs at any time. And for your next set, look first to Du Mont. Choose from magnificent consoles to grace your living room, or compact table models for den, library, or game room. Each is a masterpiece — built with precise circuitry, over-size parts, extra parts — to give you the finest possible performance.

You never foot the bill for lost travel cash when you carry American Express Travelers Cheques. They're 100% safe—you get prompt refund if they're lost, stolen or destroyed. American Express Travelers Cheques are accepted everywhere where checks are used. Most widely accepted cheques in the world.

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EXPRESS YOUR PREFERENCE FOR THE BEST!

Summer Fun THIS FALL

in Colorful

COLORADO

Vacation this fall in Colorado...where every outdoor pleasure is yours to enjoy in sparkling sunshine and tangy mountain air. Trout fishing is at its best. Big game hunting. Drive paved highways through a sky world of aspen gold. It's Indian Summer in December! Mail coupon

COLORADO PEACHES

Abundant sunshine gives them extra sugar, more juice, no lignin. Canned peaches delicious flavor. Ask for Colorado canned peaches.

COLORADO Department of Public Relations

807 State Capitol, Denver, Colorado

Send full-color Fall Vacation Guide

Send folder ___ State Highway Map

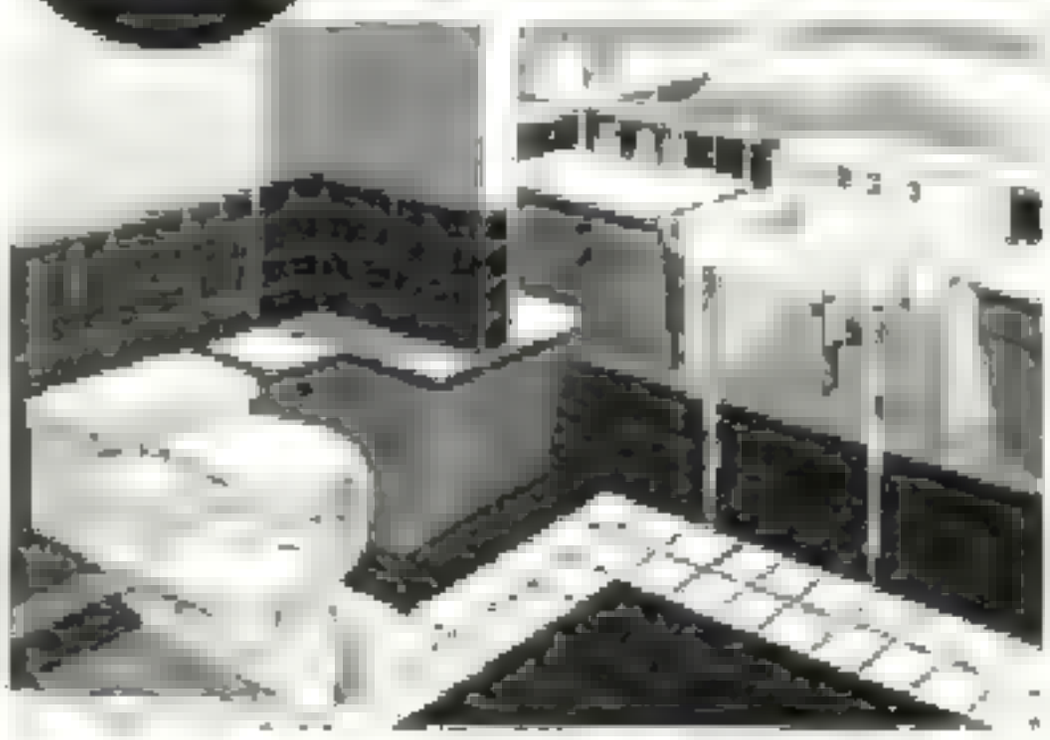
Name _____

Address _____

_____

AMERICA'S YEAR 'ROUND VACATIONLAND

Case *Fine Vitreous China*



Quiet elegance...Quiet performance

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TRAILWAYS operates more Thru-Buses than any other bus system in America!

New Orleans-Gulf Coast [illegible]

Great Smokies [illegible]

77 ALL-EXPENSE TOURS arranged by travel experts

There's a Trailways Pleasure-Planned Tour to every vacation area, for any length of time. Includes transportation, taxes, hotel accommodations and sight-seeing arrangements. Or let Trailways plan any tour to meet your individual needs. See your local Trailways agent or mail coupon below:

TRAILWAYS, Dept. G-91, 108 North State St., Chicago 2, Ill.

Please send me _____ [illegible]

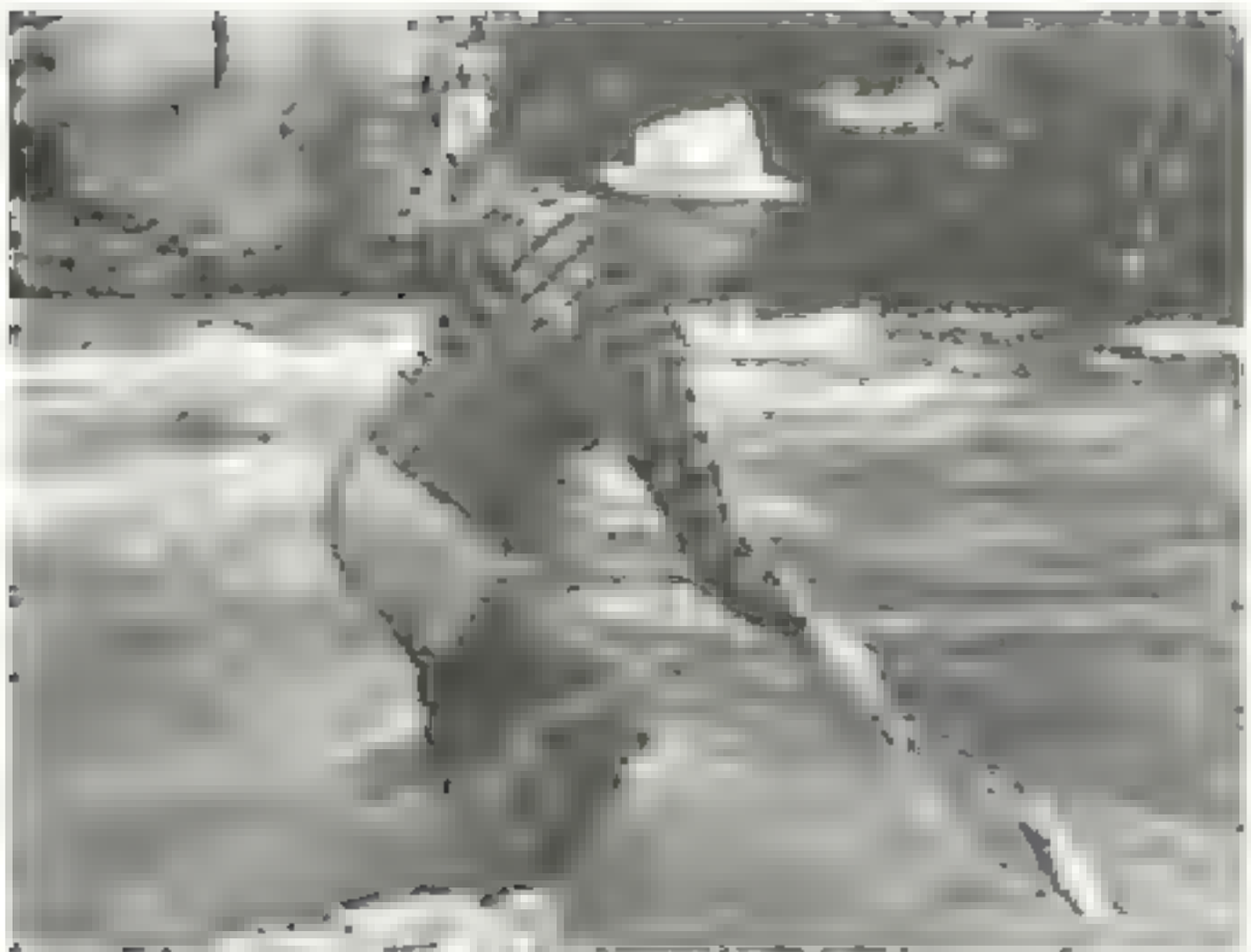
FROM _____ TO _____

LEAVING DATE _____

NAME

STREET ADDRESS

CITY _____ STATE



Take along a

Leica

E. LEITZ, Inc.

How to keep a

thrill

alive

and keep intact the

[illegible]

carry with you [illegible] to wind, sight, shoot [illegible] in any kind of photography. See the new Leica IIIf and other models at your photo-expert Leica dealer's.

So delightfully "different"
so packed with adventure
so easy to visit in perfect comfort

South AFRICA

• Land of breath-taking beauty. Photograph wild animals from your car; [illegible]

Victoria Falls. Enjoy excellent hotels, best food [illegible] comforts and [illegible] "different" South Africa. [illegible] cuisine, service. Plan your own [illegible]. Or, take our 59-day cruise with every-[illegible] included. Fare by Capetonian $650, up. For details see your Travel Agent or write Dept. [illegible]

FARRELL LINES

26 Beaver Street, New York 4, N. Y.

Everyone has a swell vacation in Ontario

CANADA'S VACATION PROVINCE

[illegible] bring the [illegible]. For a [illegible] easy driving [illegible] national customs exemptions. Enjoy your favorite sports — golf, [illegible], fishing [illegible] a colourful autumn setting. Send for your free booklet today.

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TORONTO 2, ONTARIO

Please send me free booklet about and 64 page illustrated book about Ontario

NAME

STREET

CITY STATE

Hottest thing in the skies

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

FREE [illegible]

UNION CARBIDE

[illegible]

SURPRISE awaits YOU in SOUTH AFRICA!

Your Travel Agent will tell you of the unspoiled [illegible] the magnificent National Parks, where [illegible] unless [illegible] keep [illegible] Durban [illegible] Zululand [illegible] will [illegible]

[illegible] Travel Agent, [illegible] Cape Town, South African Tourist Corporation.

South African Tourist
CORPORATION

September *and* October *are especially wonderful months in* SAN DIEGO

[illegible]

[illegible] YOUR TRAVEL AGENT

For added pleasure see Old MEXICO

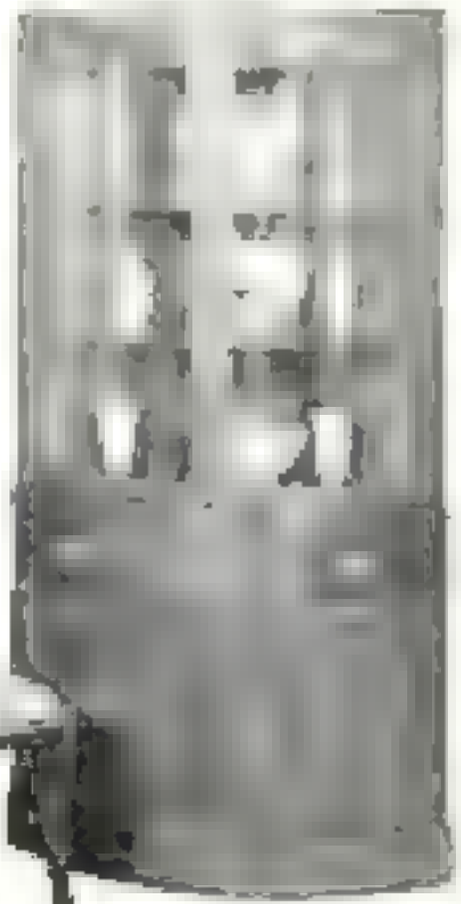
San Diego WHERE CALIFORNIA BEGAN

[illegible] SAN DIEGO-CALIFORNIA CLUB

[illegible]

I will come by ☐ Auto . . . ☐ Train . . ☐ Air . . ☐ Bus

Before purchasing [illegible] more expensive, shop and compare for [illegible] quality, and [illegible] a visit to the Rway [illegible] and be [illegible] rewarded. [illegible] Rway [illegible]



RWAY FURNITURE CO.

[illegible]

See phone book for nearest Rway store in [illegible]

[illegible]

FOR THE WORLD OF MUSIC

--At its Finest!

Zenith Quality

Radios and Radio-Phonographs Alone Bring You Super-Sensitive FM

No finer music ever fills the concert hall itself. The clear, uninterrupted, static-free music you enjoy on Zenith FM. And now, with Zenith's amazing new [illegible], your enjoyment [illegible] heights!

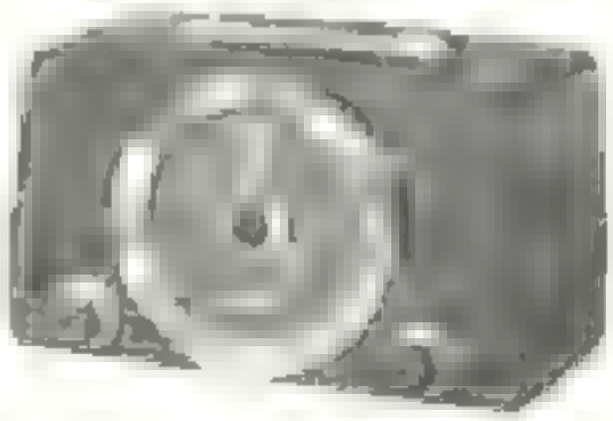
Reaching far beyond the usual FM range, powerful Zenith Super-Sensitive FM brings in more stations, more programs. And, with Zenith's larger, more sensitive [illegible] brings you a revelation in full, rich, glorious tone. Now, superb Zenith tuning [illegible] present station drift [illegible] tuning. Tune easier and *stay tuned*. No antenna is needed in [illegible].

Choose Zenith table radios and working radio-phonograph combinations with you enjoy [illegible] the features of this better FM, plus famous Zenith [illegible] AM reception, too. See them now at your Zenith [illegible] dealers.

World's Finest Record Playing, Too! New Zenith "Tel-u-Matic" . . . first and only record player that lets you play every record — all records — at the exact speed at which they were recorded . . . [illegible] like you to aid you for perfect p[illegible] tempo and tone quality. Lets you play now only 33⅓, 45 and 78 R.P.M. but all intermediate speeds between 10 and 80, including the coming new 16 R.P.M. [illegible] playing. Yours only on Zenith table [illegible] phonographs!

Zenith Radio Corporation [illegible]

Above: New Zenith "Tudor" [illegible] AM [illegible] and period cabinet [illegible]



New Zenith "Super-Symphony." Super Sensitive FM. Long Distance AM. [illegible] Walnut [illegible]

ZENITH RADIO TELEVISION

$3.76

to see

THE TROSSACHS

Scotland's Scenic Wonderland!

(From Edinburgh or Glasgow)

Travel in Britain is amazingly inexpensive!

So, stay longer and see more. Make sure of maximum savings—buy ALL your British transportation before you leave. (Bargain "go-as-you-please" Mileage Coupons, for example, are NOT sold in Britain.) Secure your reservations too, on trains, channel steamers and at any of the 47 hotels of The Hotels Executive—start your trip with **assured accommodations** awaiting you.

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39 So. La Salle Street

LOS ANGELES 14, CAL.
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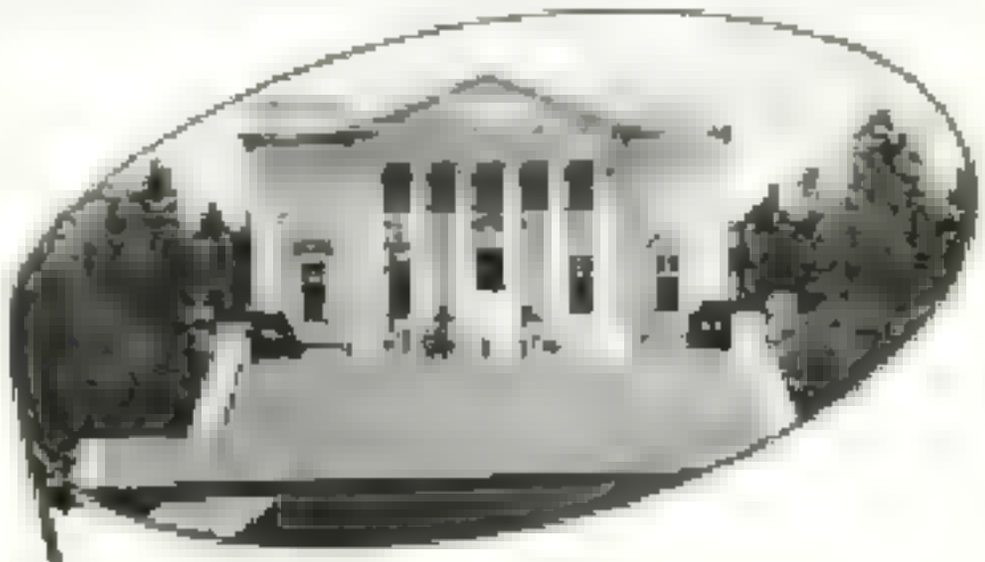
TORONTO, ONT.
69 Yonge Street

BRITISH RAILWAYS

"WHILE THESE BELLS RING, SAFETY BEST, FREEDOM LIVES!"



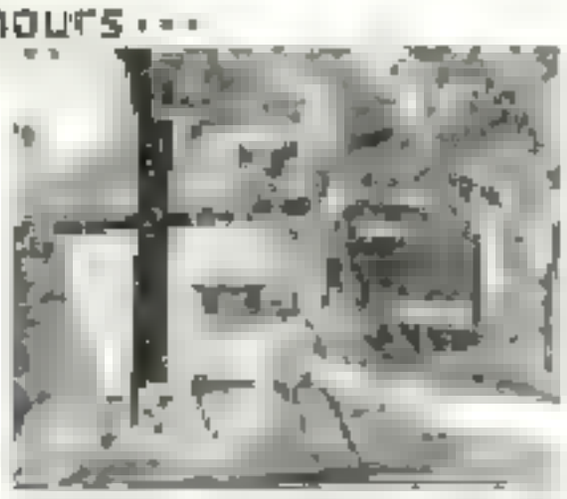
Bells that Voice a Nation's Faith

[illegible]

CARILLONIC BELLS

Schulmerich Electronics, Inc.
32201 Carillon Hill, Sellersville, Pa.

Count the hours...



count the glories...

count the blessings

of Pennsylvania's color-drenched autumn as your own for a remarkable vacation at reasonable cost.

[illegible] spend with us will [illegible]

[illegible] famous [illegible]

[illegible] inspirational vacation—*come during Pennsylvania Week October 15 through 21.*

COME TO

Pennsylvania

AMERICA'S BIRTH- OF-FREEDOM SHRINE

[illegible] Governor — Andrew J. Stevenson, Secretary of Commerce

[illegible] Pennsylvania Department of Commerce
Division 9C-M 9 Harrisburg, Pa.

I want to know more about Pennsylvania Vacation Lands. Please mail your free book

Name _____

Address _____

City _____ Zone _____ State _____

In a [illegible] All this food—and more—can be placed in the [illegible] Refrigerator shown below!

25% to 50% more food space

in new, dependable General Electric Refrigerators

G-E Refrigerators give you much more storage space than most old-style refrigerators now in use...yet they occupy no larger floor area!

When you go to buy that [illegible] also [illegible] you need, be sure that it has [illegible]

First, you want ample food space.

You want a [illegible] features. And, has [illegible] special features you will find in no other refrigerator.

[illegible] No other refrigerator can surpass the General Electric record for dependability. More than [illegible] G-E Refrigerators with sealed [illegible] have been in [illegible]

[illegible] phone [illegible] Electric Company, Bridgeport [illegible]

General Electric
REFRIGERATOR-FOOD FREEZER COMBINATION

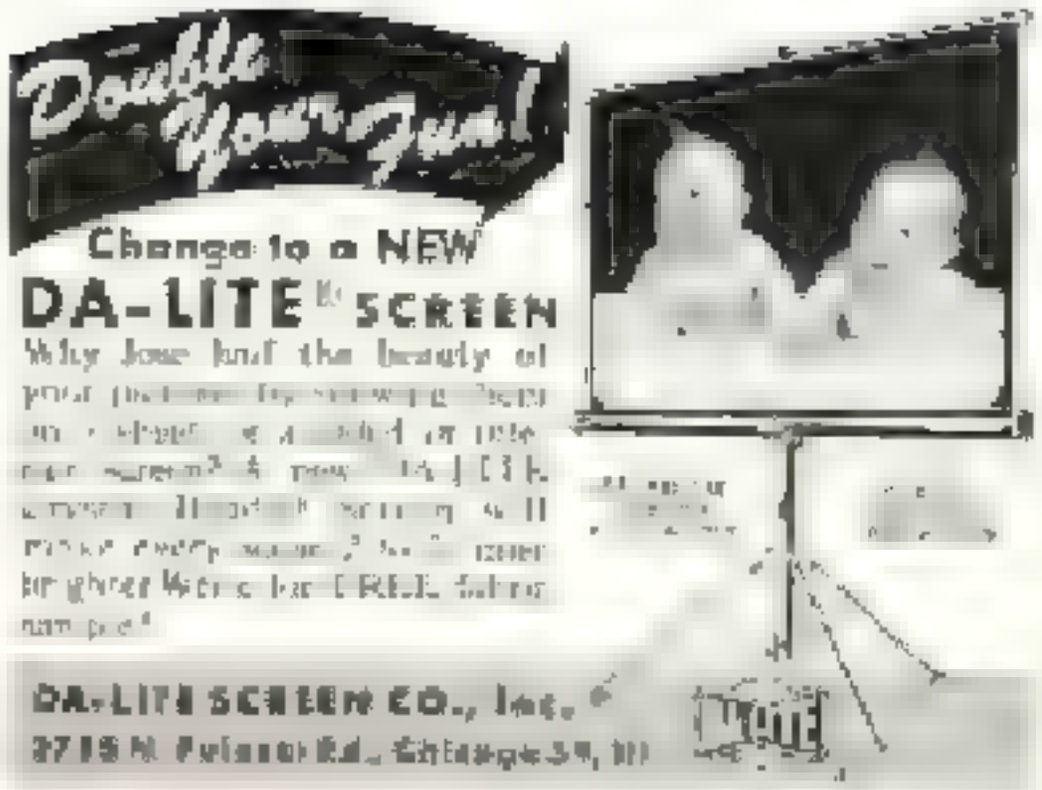
The frozen-food [illegible]

Red-Cube Ice Trays Pick out cubes [illegible] and return the rest—and it [illegible] into the refrigerator.

Frost does not [illegible]

You can put your confidence in—

GENERAL ELECTRIC



NEW NATIONAL GEOGRAPHIC

ENLARGED MAPS

UNITED STATES — 67" X 43 1/2": This superb enlargement of the new U. S. map which came with the June NATIONAL GEOGRAPHIC will make a timely, 10-color wall display with the Asia map below—portraying the two great centers of power in today's tense world. U. S. cities and towns graded according to 1950 census. Scale, 1:1,125,000 or 49 miles to the inch.

ASIA & ADJACENT AREAS — 62 1/2" X 49": This five-foot, 10-color, chart presents the whole vast theater of international crisis as of Feb. 1, 1951: entire Far East, Russia, Europe, part of Africa. Scale, 1:9,000,000 or 142 miles to the inch.

OTHER ENLARGED 10-COLOR MAPS: "Blue Lands," 64 1/2 x 44 1/2 inches; "The World," 67 x 43 1/2 inches; "Northern and Southern Hemispheres," 67 x 57 inches.

INDEXES to place names available for each map.

PRICES: all enlarged maps $2 each in U. S. & Poss. Elsewhere, $2.25. Mailed rolled in U. S. & Poss. Postal regulations prevent rolled mailing elsewhere. Indexes 25¢ in U. S. & Poss. Elsewhere 50¢. Otherwise only from

NATIONAL GEOGRAPHIC SOCIETY
Dept. E-2, Washington 6, D. C.

CHOOSE

the right point for the way you write

for easier . . . clearer writing

Student, lawyer, merchant . . . doctor, secretary, salesman, clerk . . . whoever you are, whatever you write, however you write it . . . there's an Esterbrook Point that is exactly suited to your writing.

Choose your Esterbrook Point at any pen counter. Screw this point into the Esterbrook pen barrel you choose for color and style . . . and write. Learn, first-hand, why Esterbrook is first choice with those who buy a pen for their own use.

In case of emergency, you can replace your favorite numbered point instantly and inexpensively at any pen counter.

POCKET SET—Esterbrook Pen and matching Push-Button Pencil holds two feet of lead. Writes for months without refilling. [illegible]

FOR YOUR DESK—Model 444 Desk Pen Set. With full [illegible] of Assorted Points. Base holds 40 times more ink than ordinary fountain pen desk sets. Fill it once, write for months.

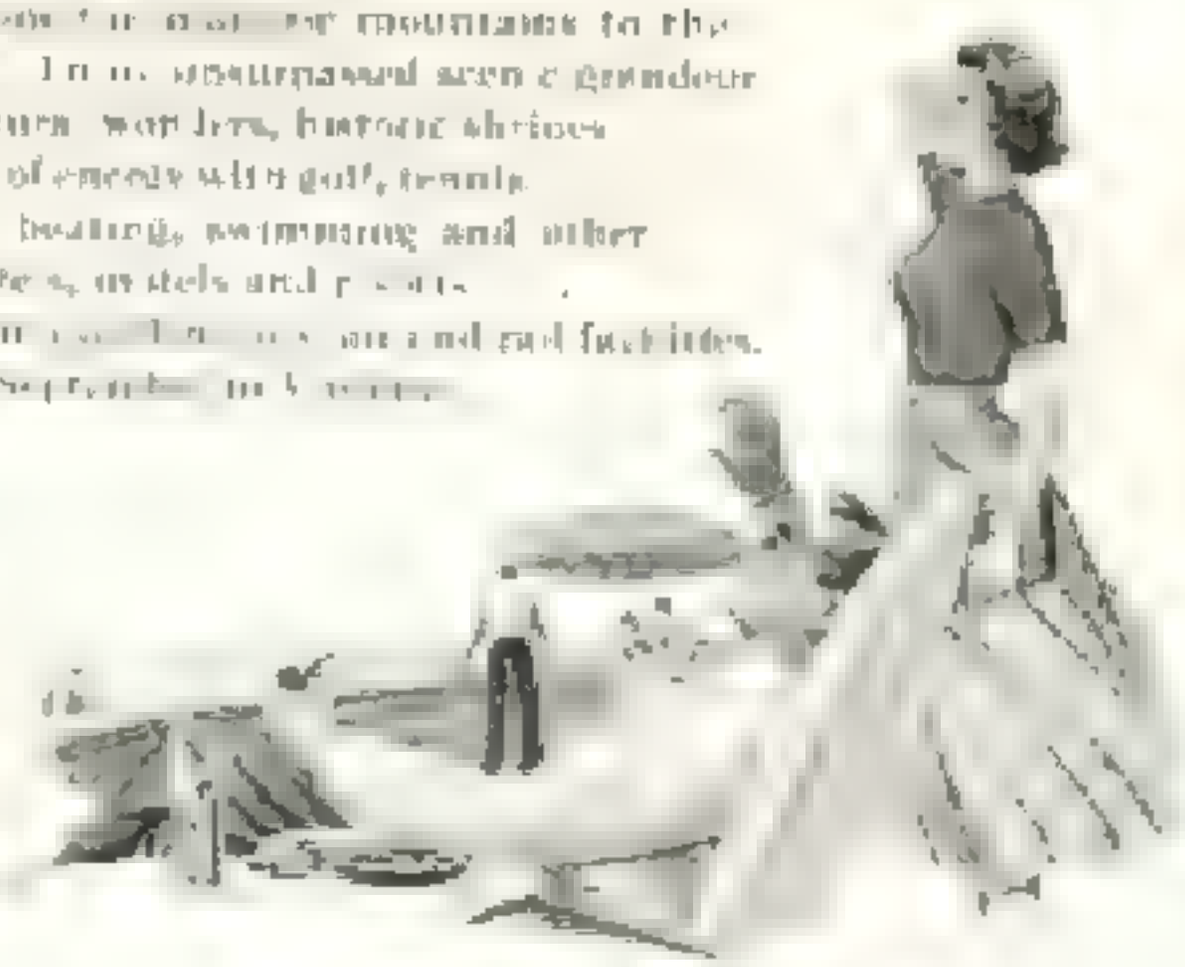
Esterbrook

FOUNTAIN PEN

Esterbrook—America's Pen Name Since 1858

Enjoy Lazy Golden September

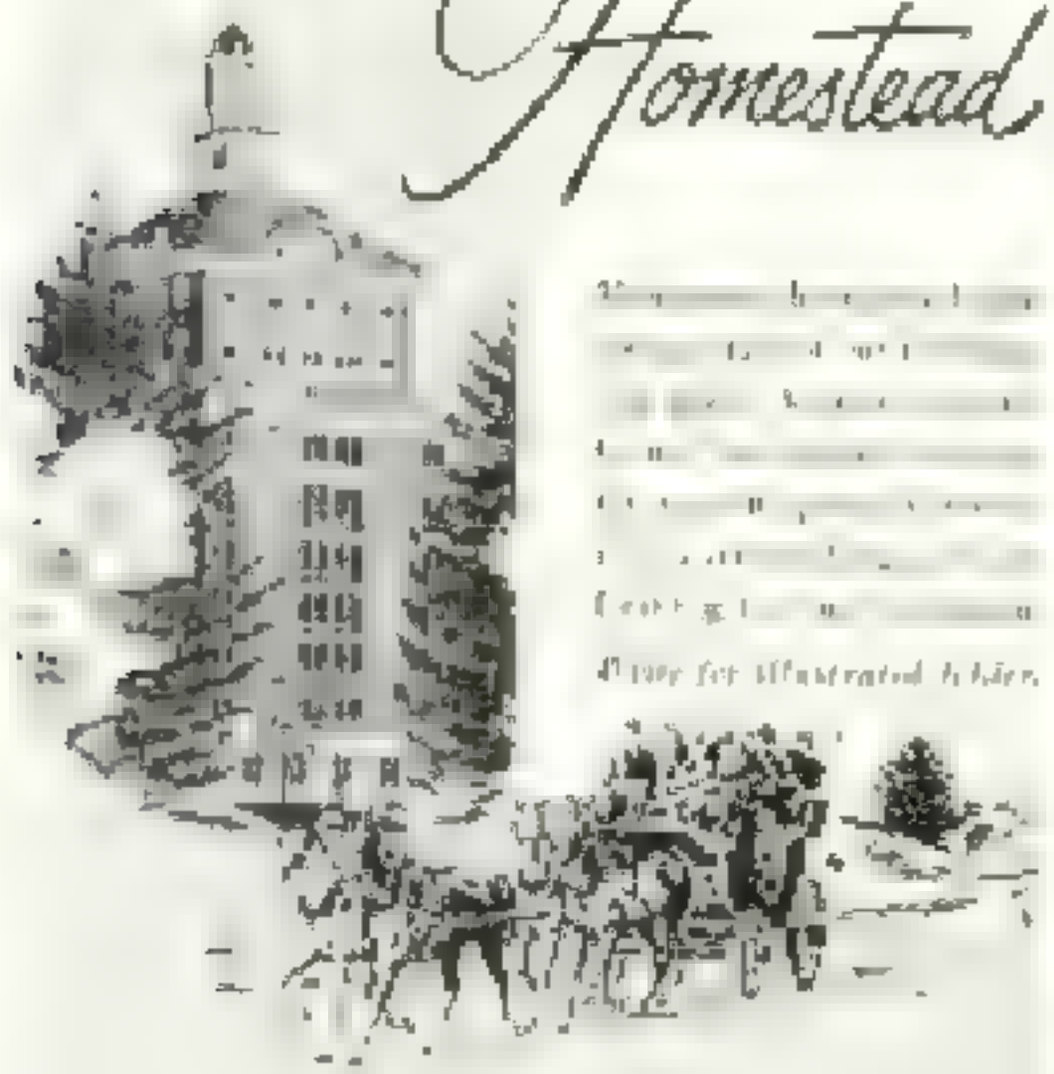
in VIRGINIA



Visit

DEPARTMENT OF
CONSERVATION AND DEVELOPMENT
Room 819, 914 Capitol St.
Richmond 19, Va.

AUTUMN AT THE *Homestead*

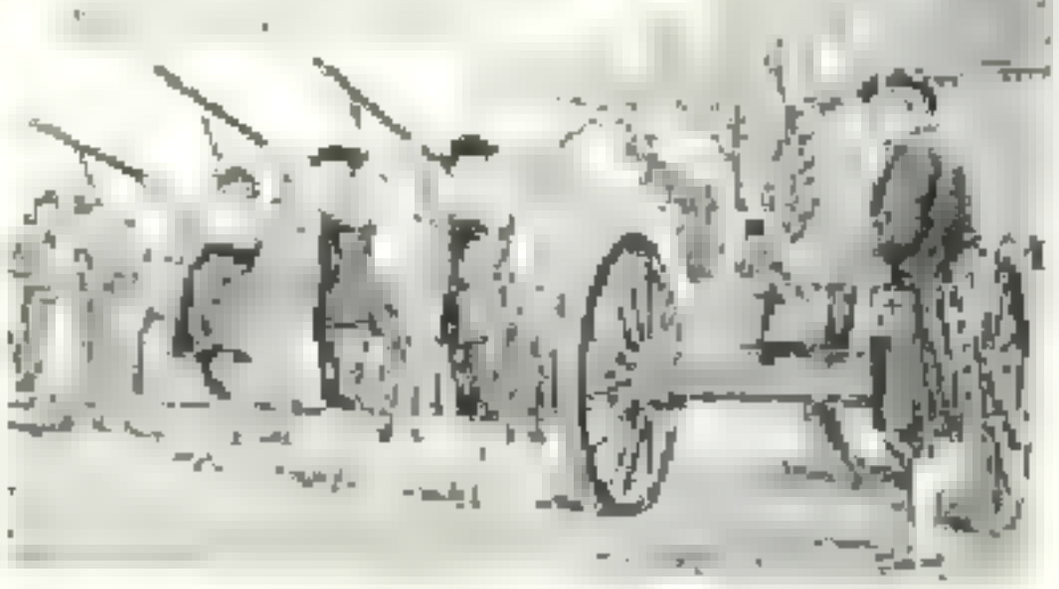


The HOMESTEAD

SALUTE AMERICAN FREEDOM

at *Williamsburg*

WILLIAMSBURG INN

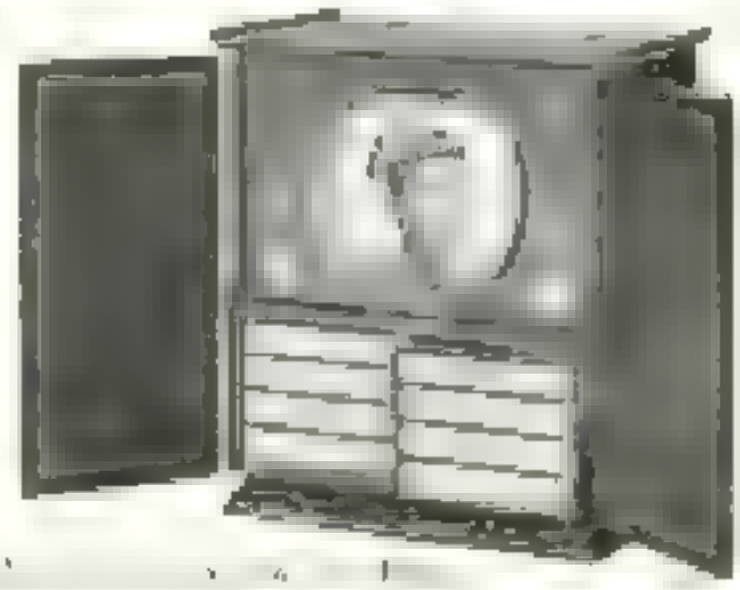


the Chinese Classic by Stromberg-Carlson [illegible]

A complete home entertainment [illegible] hand-lacquered by [illegible] every or ebony lacquer—each an individual masterpiece, exclusively yours. For some relaxed hours of enjoyment there is big-picture 19" television . . . outstanding AM-FM radio . . . 3-speed record-player [illegible] The longer you look at it, the more convinced you'll be, "There is nothing finer than a Stromberg-Carlson."

"There is nothing finer than a

STROMBERG-CARLSON"



I Wear False Teeth

yet my mouth feels fresh, clean and cool—thanks to Polident!*

"Every day I soak my plates in a solution of Polident and water. My mouth feels clean and cool all the time . . . and no Denture Breath."

Mr. A. G. R., New Milford, Pa.

YOU know what Mr. R. means—don't you! It's a wonderful feeling to know that you're not offending friends with Denture Breath.

Soak your plates in Polident every night. It's so easy and quick. And Polident seeps into every corner and crevice [illegible] scrubbing never seems to do.

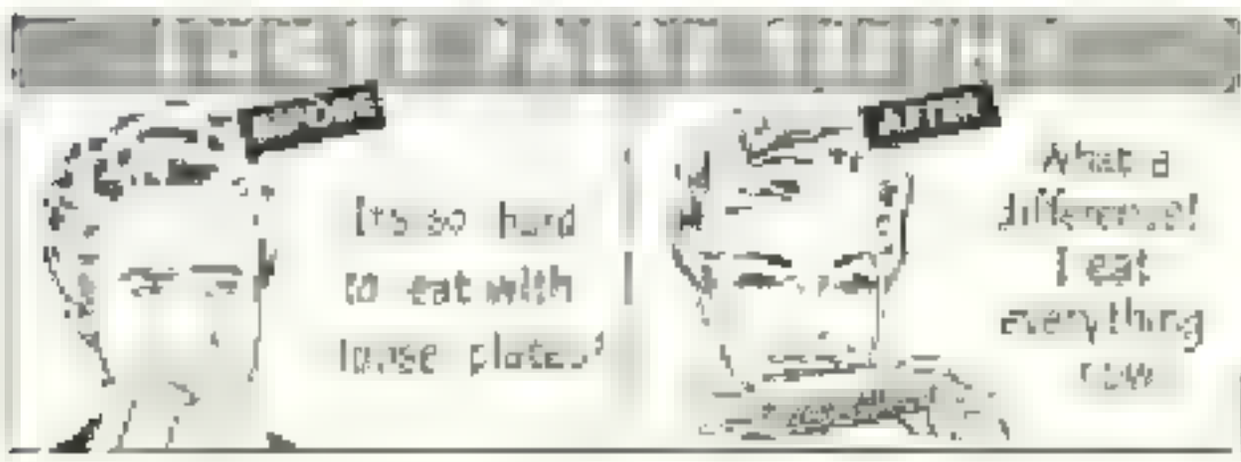
Remember—these dental plates of yours need the *special* care of a [illegible] denture cleanser. Don't brush them. Soak them in Polident (for only [illegible] a day) to keep them clean and free from Denture Breath. Supply [illegible] of Polident [illegible]

Soak plate or bridge daily—fifteen minutes or more—in a fresh cleansing solution of Polident and water.

No Brushing

POLIDENT

Recommended by more dentists than any other denture cleanser



Amazing New Cream Holds Tighter, Longer than anything you've ever tried or double your money back

POLI·GRIP

[illegible] National Geographic—Is [illegible] you

Do your eyes need help?

According to recent estimates, one out of every five children of school age has faulty vision. [illegible]

To help maintain [illegible] about life and promote [illegible] mental health, doctors recommend that everyone follow the safeguards below.

The child's eyes . . .

Faulty visual habits are often formed during childhood which may lead to defects in later years when correction may be more difficult.

A child's eyes should be examined once three or four, again before he enters school and after starting to read—even though no signs of eye trouble are evident.

There are many common diseases that affect the eyes of children. Most of them are mild but some may be serious. Both may start in the same way—with redness, flow of tears, blinking, squinting, scowling, accompanied by little or no pain. So, if these or other signs of eye trouble appear, it's wise to see a doctor.

Specialists caution against delay in the use of glasses if a child needs them. Glasses usually help the child to improve his vision and correct other eye defects—often within a relatively short time.

The adult's eyes . . .

After age 40, periodic examinations are especially important. They provide [illegible] of the eye itself. Second, [illegible] to detect conditions such as high blood pressure, [illegible] hardening of the arteries which often reveal themselves by changes in the eyes.

Fortunately, more can be done today than ever before to check or cure some of the most common eye conditions—thanks to new [illegible] and improved surgical techniques.

Three common eye defects—nearsightedness, farsightedness, and astigmatism—can usually be corrected by properly fitted glasses. Only an eye specialist is qualified to prescribe glasses or other aids.

Under proper medical care, most of the threats to good vision can be corrected or cured so that the eyes may be used effectively throughout life.

To help keep the eyes in good condition.

1. Read where it's clear, good light falls from above and behind you.
2. Rest your eyes at frequent intervals when reading or doing close work.
3. Except for easily removable particles, trust only to expert help for removing a foreign body from the eye.
4. Be alert to the warning signs of eye trouble—headaches, eye fatigue, blurred vision, inflammation of the eyes or lids, spots before the eyes and colored halos around lights.
5. Use eye safety devices exactly according to instructions.
6. Have your eyes examined regularly by an eye specialist.

Metropolitan Life Insurance Company

When their footsteps shook the ground

When a [illegible] world made an immense stretched mess around our table, only explorers knew they were up against a decided muddy swamp.

If they stood still on this ground they would sink through the mat of moss and flounder in the muck beneath. But if they immediately lay down on the moss and kept moving along like a [illegible] they usually [illegible]

[illegible] to get bogged down in a [illegible]

[illegible] accident or [illegible] a crippling accident, or even [illegible] never plunge your family into [illegible]

MORAL: INSURE IN

The Travelers

ALL FORMS OF LIFE AND ACCIDENT INSURANCE

HARTFORD 15, CONNECTICUT

Sheaffer's

Sentinel Pencil $5.00

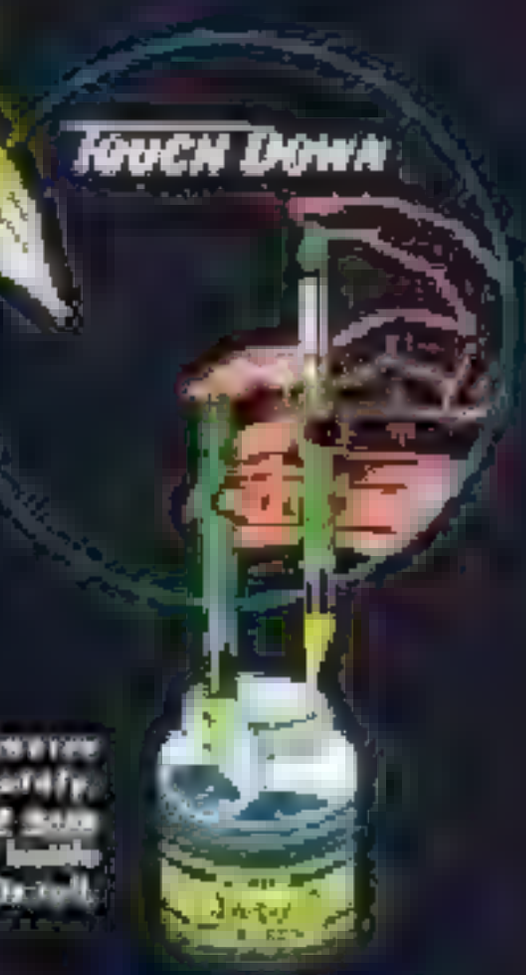
Sentinel II Pen $15.00

Sentinel Ballpoint $10.00

THE THINNER THE BETTER...

No other self-filling pen has ever held so much fluid in so slim a barrel. No other can. For the secret of TM Intrepid is Sheaffer's alone—the exclusive down-stroke Touchdown filler that makes a pencil-slim pen possible for the very first time! Match TM with Sheaffer's instant-writing, dependable Stratowriter Ballpoint and precision-built Fineline Pencil—gift of services for services performed—priceless advantage for the back-to-school student.

Sheaffer's Pens from $3.75—all with exclusive Touchdown



Fastest Pen to Fill. Immerse point in fluid completely. Push plunger down just once and watch the fluid be hauled up talent as your pen fills itself.

Student Special

ADMIRAL
Pen, $3.00
Pencil, $3.75
Ballpoint, $3.00

Threesome
gift-boxed, $13.75

SHEAFFER'S

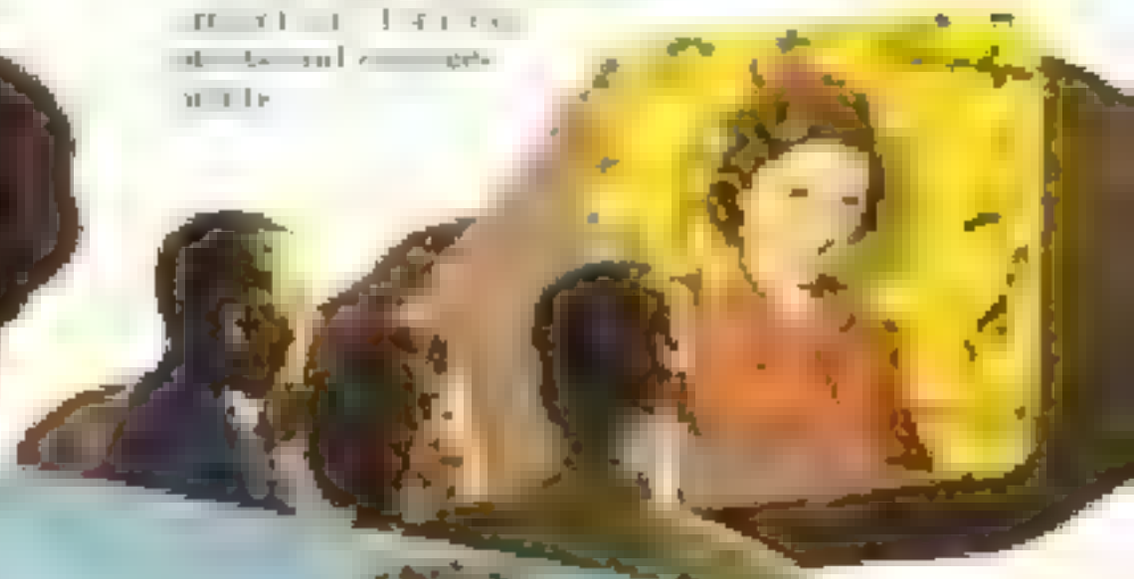
© W. A. SHEAFFER PEN COMPANY, FORT MADISON, IOWA, U.S.A.
IN CANADA: BRANTFORD, ONTARIO.

You are a color photographer the minute you load your camera with color film

If you have a box, folding or reflex camera

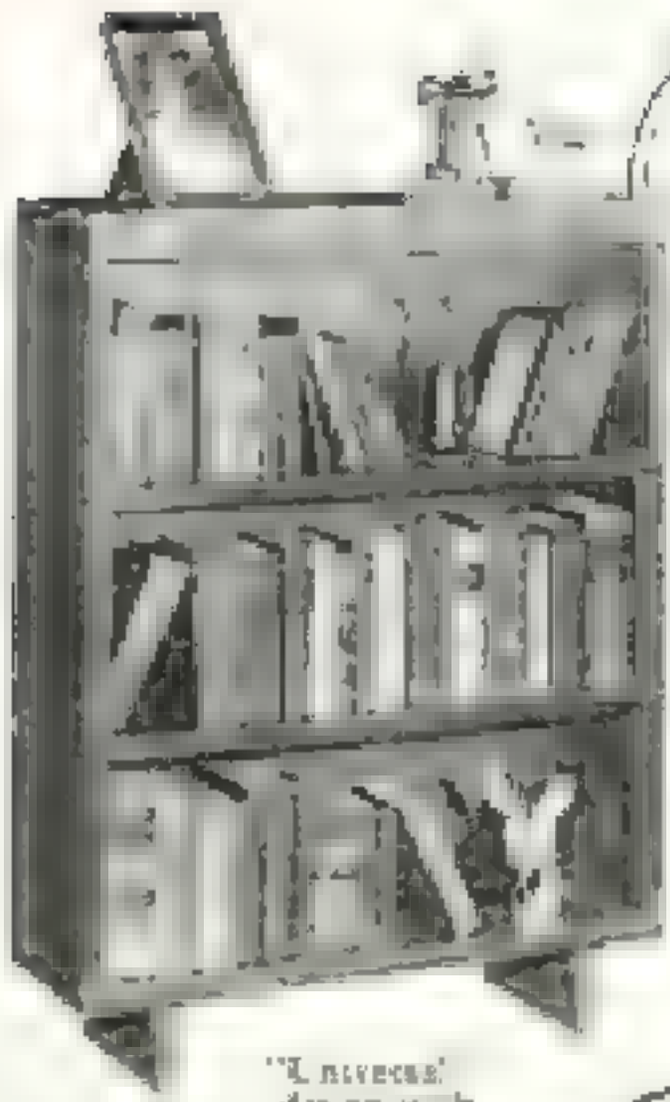
If you have a movie camera

If you have a miniature camera



Color with your camera? Certainly! The color is on the film—you simply follow directions packed with every roll. Kodak, wonderful color pictures which you can share with family and friends—on your home screen or with extra full-color prints. **Eastman Kodak Company, Rochester 4, N. Y.**

It's Kodak for Color



"Universal" design with modern base and tops. For home or office

QUIET **BOOKS WORKING** ZONE

...On Duty IN MODERN STYLE CASES

GLOBE-WERNICKE introduces bookcases in *charming new designs!* Distinctive styling in excellent taste—and now beauty in "the original" sectional feature, so welcome where books are frequently used!

Smoothly sliding glass doors give full, clear vision—operate quietly. Book sections in three heights, to accommodate all sizes of books. Choose your base—modern, conventional or legs. The tops harmonize in design.

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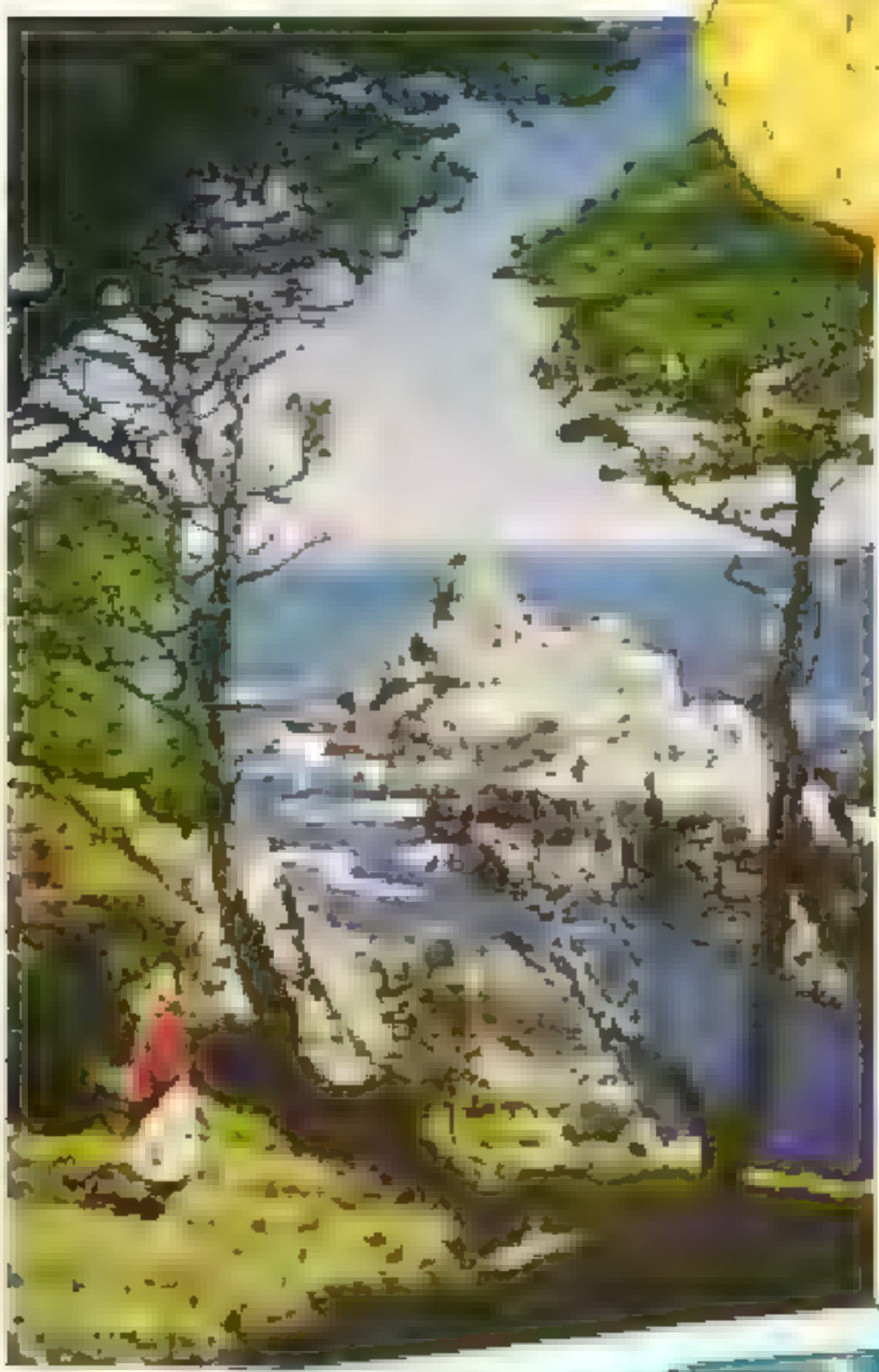

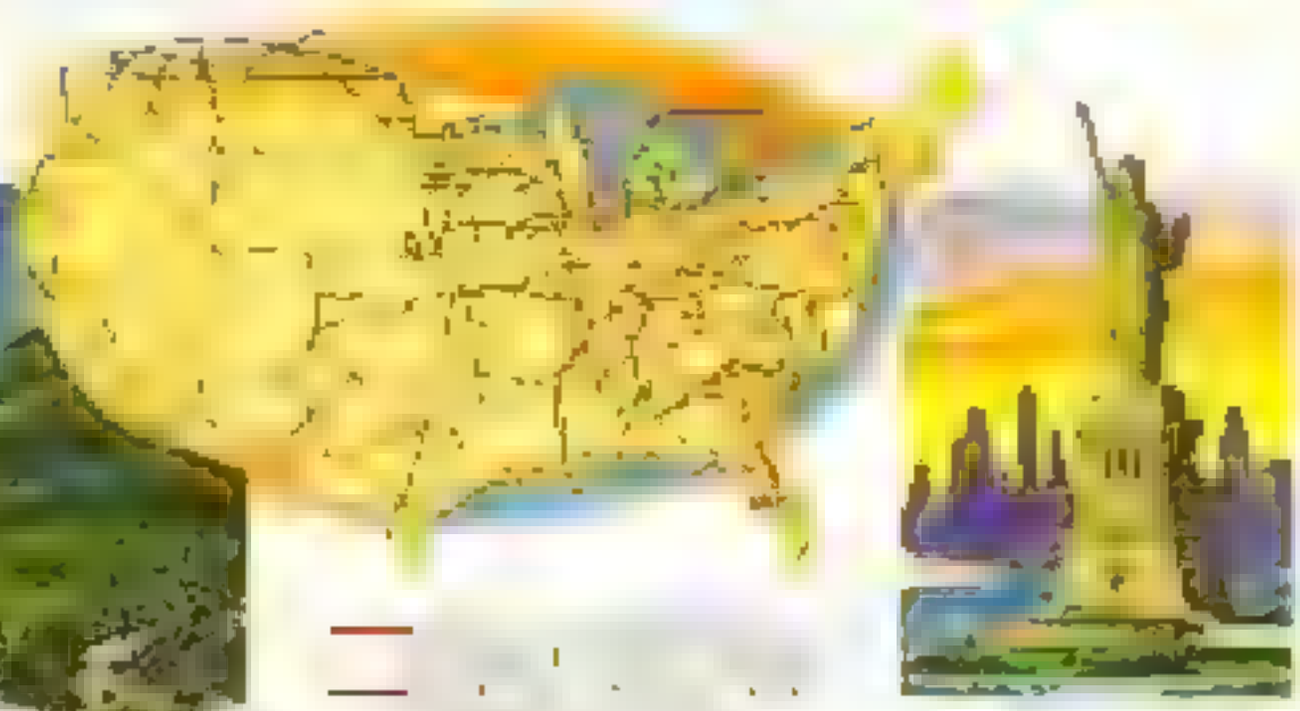

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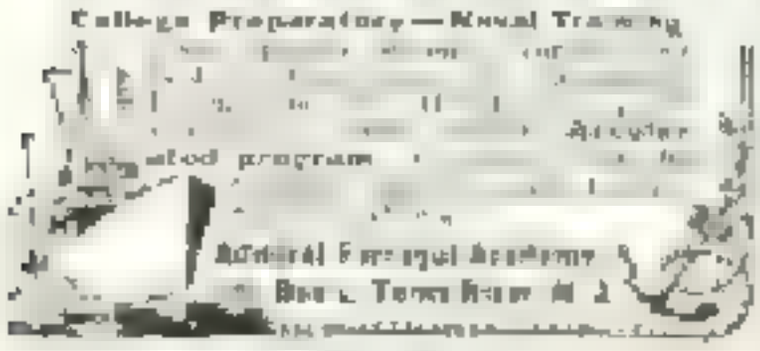

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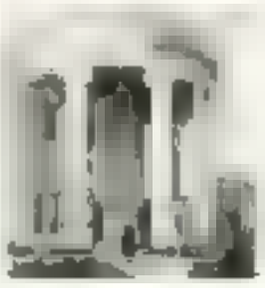

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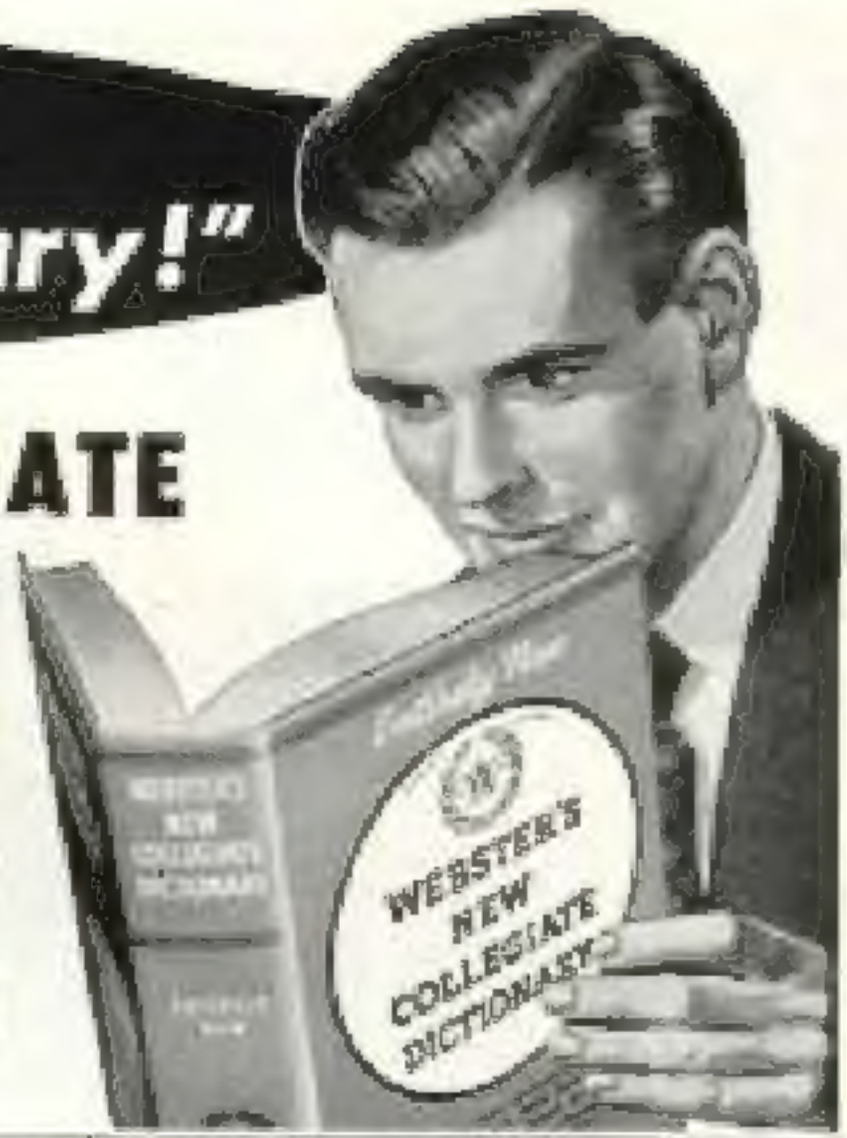

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